

THE IRON AGE

THE NATIONAL METALWORKING WEEKLY

October 12, 1950

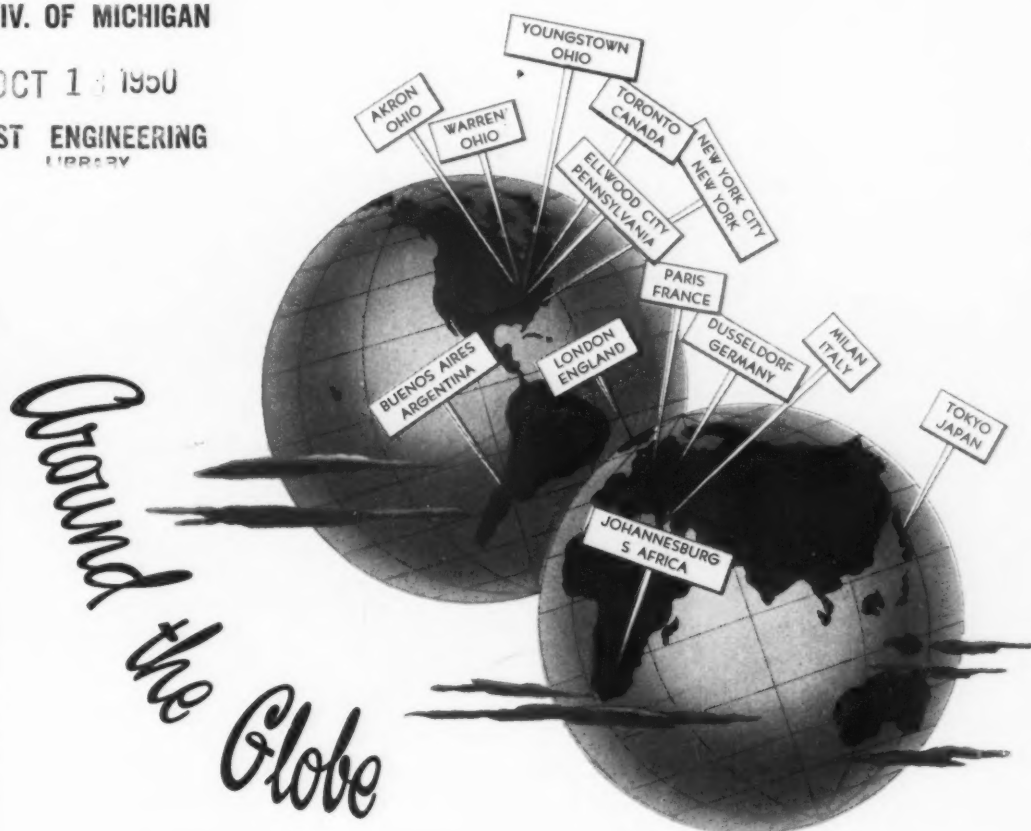
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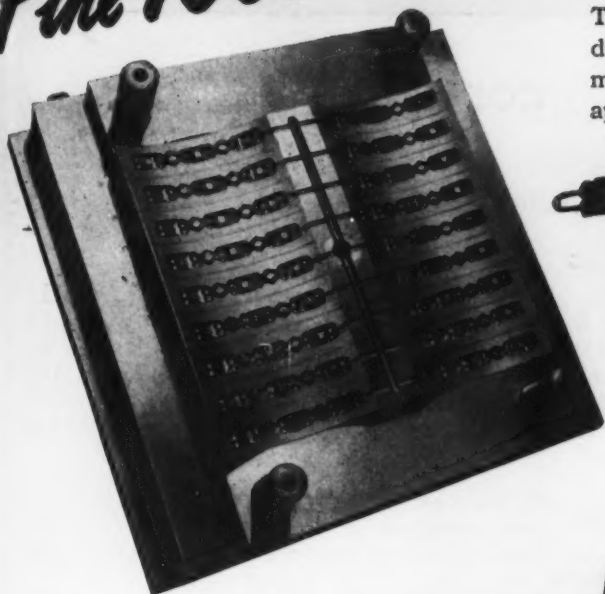
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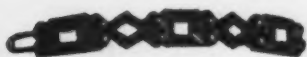
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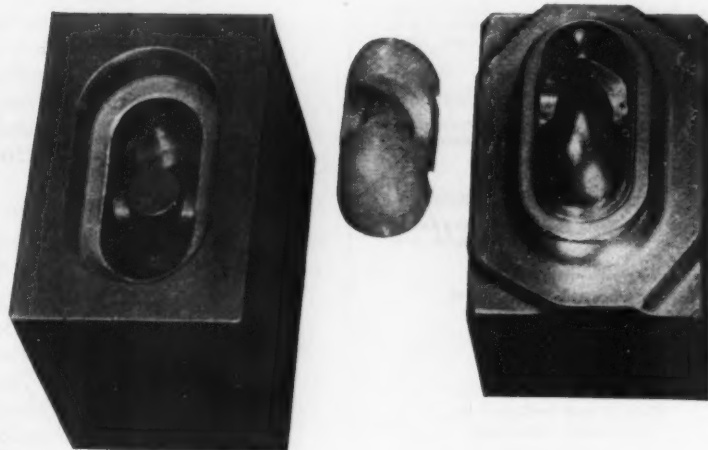
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The master hob at far right, made from 67 Chisel, produces an accurate mold cavity in the hobbing die steel at left. The plastic molding in the center is a refrigerator door catch. 67 Chisel has the high strength and low distortion for master hob applications. It is carburized for greatest wear-resistance.



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THE IRON AGE

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Special Metal Show Issue



Feature articles in this special issue reinforce the theme of the National Metal Congress & Exposition, Chicago, Oct. 23-27, "High Production in an Emergency." Besides those listed below there is a complete program of the technical papers (p. 154) and a list of exhibitors (p. 177). Actual case histories of new production ideas in welding (p. 170), and metallurgy and process control (p. 164) are featured in two special notebooks.

Issue Highlights



For inert gas shielded welding, helium offers higher heat, deeper penetration, faster speeds. Argon needs lower heat, gives smoother operation with less spatter.—p. 155.



Vanadium rimmed steel combines the superior surface of rimmed steel with the non-aging properties of Al-killed deep drawing steels. It can be shipped in coil form.—p. 158.



Small companies are now taking advantage of the facilities and skills of nonprofit research institutes. Project volume has reached multi-million dollar proportions.—p. 166.



Metalworking industries will have to use a lot of ingenuity to cope with the nickel shortage. Belated government stockpiling is aggravating the shortage. Some substitutions are already in effect.—p. 181.



Steelmakers generally are of the opinion that the order establishing DO priorities will prove unworkable in its present form. But they believe that recommendations of the steel task force may lead to later clarification.—p. 184.



Steel people are concerned about supplies of iron ore, pig iron and coke. They are scrambling for foreign pig iron, shipping iron ore all-rail and producing every possible pound of coke.—p. 187.



Consumers of steel realize that climbing costs (including wages) might mean higher steel prices. This is putting even more steam in the market. They realize that other industries have already broken the ice on wage-price increases.—p. 193.

Coming Next Week



Cold extrusion of shells at Mullins Mfg. Corp. cuts steel use by 40 pct over previous forging methods. Mn content is cut in half. Better tolerances are obtained.

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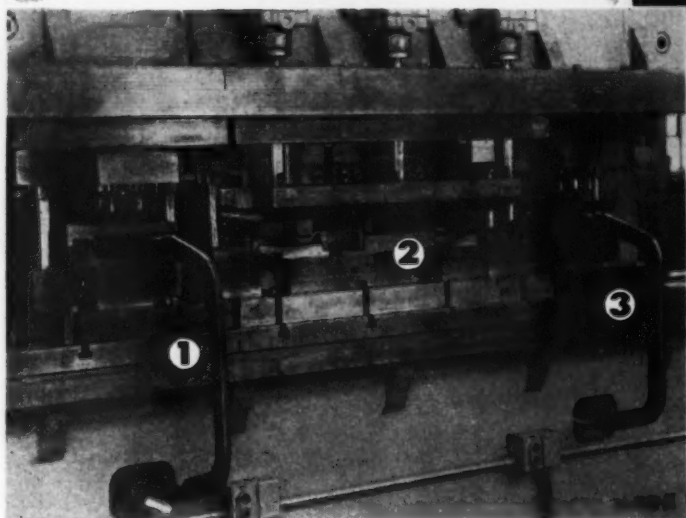
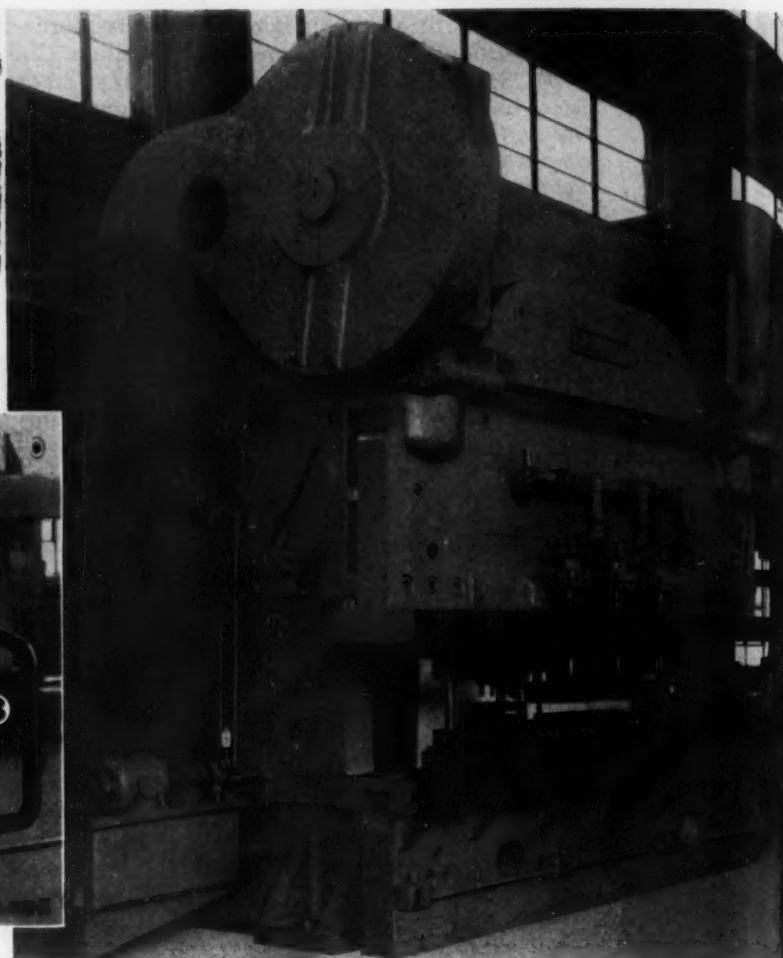
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Editorial

— I N D U S T R Y V I E W P O I N T S —

Handicaps Are Gold Mines

MAKE no mistake about it we have a terrific manpower shortage in the making. Already many plants have had to cut production due to lack of manpower.

Don't depend on Washington to help you. They don't even recognize now that things are as serious as they really are. When the defense department gets rolling toward that 3 million man armed force things will be tough—for industrialists.

Not only will people go into the service, but remember it will take about ten people on the home front to supply and service one of the military. How come? That's easy to figure.

Munitions and straight defense work have priorities. That means steady work with the "help wanted" sign out. Men will flock there.

Aircraft people have the greatest order backlog since the last war. They are being pushed. They will get their workmen somehow. Gun, cartridge makers, landing craft manufacturers, ammunition makers and a lot of other direct defense plants will be the same way.

Don't count too much on the fair sex. There will be a lot of gals to pick from but not as many as used to be. Why? Simply because it is the fashion now to have kids. When you have kids you are not so ready to take a defense job. Ask the girl who has a flock of them.

There is a gold mine you can tap—if you haven't already done it. Last week was "Help the Handicapped Week." It should have been "Let the Handicapped Help You Week."

Today for the simple reason that they are good, skilled, loyal and enthusiastic workers, handicapped people are helping hundreds of industrial companies.

They have fitted into the most skilled jobs.

Some are legless, some are armless, others have slight handicaps and, believe it or not, there are many who are blind and are doing important jobs at the bench or the machine.

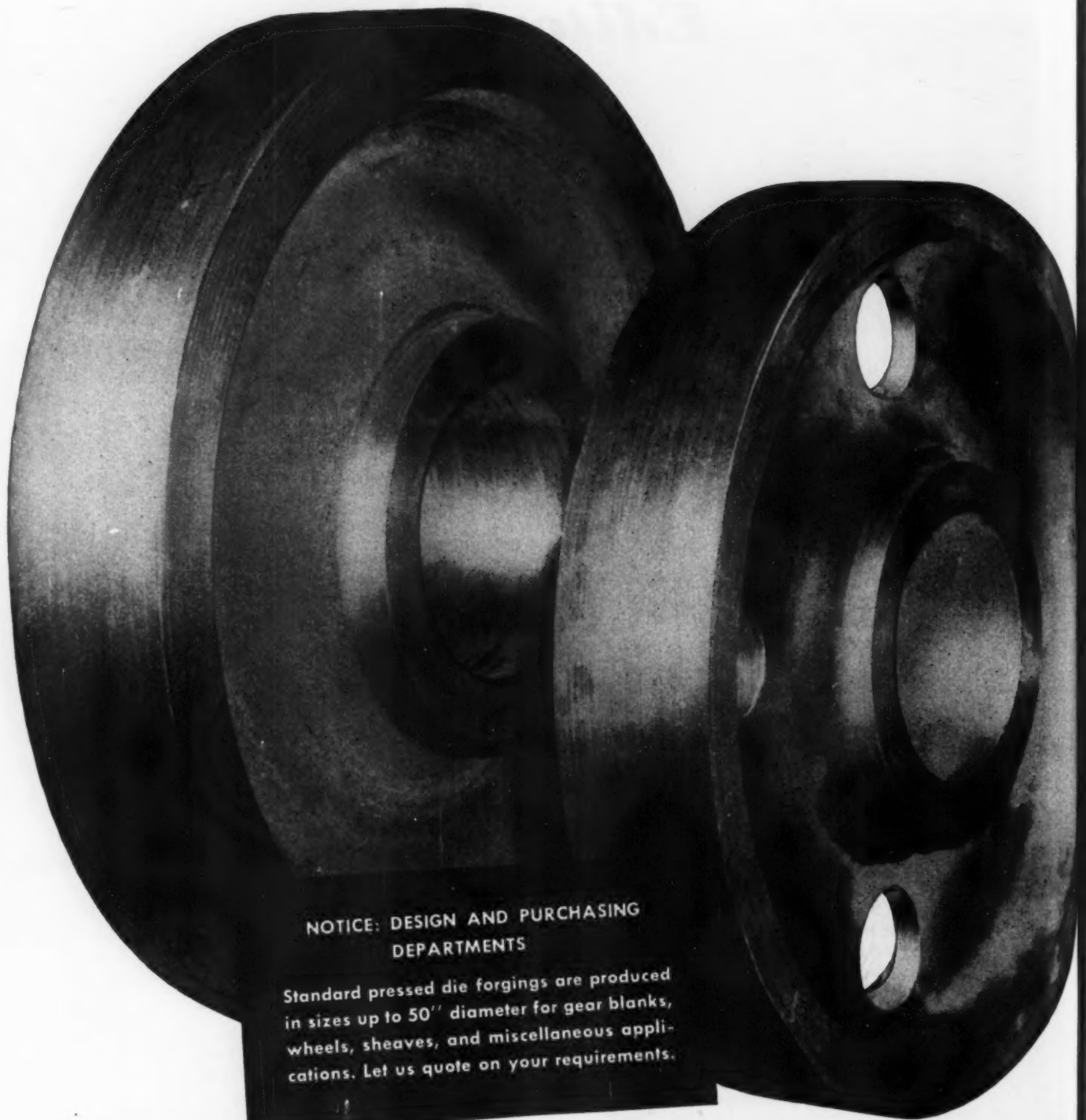
Check your Veterans' Administration, your local hospital, your blind association, your Salvation Army headquarters. Or just let it be known you want to give the handicapped a chance.

Use patience in training; use understanding in handling. Use them not because manpower is tight but use them as everyday permanent employees. They will pay dividends.

Tom C. Campbell

Editor

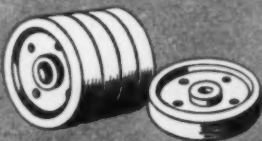
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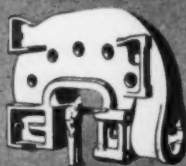
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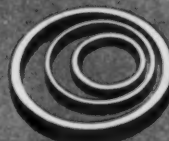
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STEEL CASTINGS



WELDLESS RINGS



FORGINGS

NEWSFRONT

NEWS. METHODS AND PRODUCT FORECAST

- ▶ A General Motors plant saved about \$50,000 last year by adding starch to compounds used in spray booth water. Addition of starch prevents clogging of pipes, circulating pumps and nozzles and makes paint flow on top of the tanks where it is easy to skim off.
- ▶ Adhesives developed in laboratory work have withstood loads up to 10,000 psi in tension.
- ▶ New gas furnaces on continuous electrolytic tin lines replace the batch method for fusing the tin coating. They are being used in two steel company plants.
- ▶ Benzol, now supplied as a coke oven byproduct is in such short supply that one producer recently turned down an offer at 60¢ per gal—double the regular market price.
- ▶ Look for some unexpectedly high earnings reports at the end of the fourth quarter. Most accountants are planning to defer charging off as much expense as they legitimately can this year and to take it next year when taxes are higher. Normal practice is to cram as much as possible onto expense in a good year and let the next year take care of itself.
- ▶ Simultaneous pickling and phosphate coating—using a phosphoric acid solution—has proved economically practical in the plant of a large tractor manufacturer. The comparatively high cost of phosphoric acid is reduced by using an ion-exchange resin to reclaim acid for reuse.
- ▶ Stainless steel producers are trying hard to get customers to send back stainless scrap directly—and promptly. With the big users the problem is not too difficult but smaller plants have to sell to dealers. Then it takes more time to accumulate before carloads can be made up. Efforts are now being made to cut a month or two off this normal time lag.
- ▶ The importance of automotive fuel development in the U. S. economy is emphasized by the fact that on the average, a 3200-lb car burns more than its own weight in gasoline each year (4200 lb).
- ▶ A new super high speed motion picture camera takes pictures so fast that it would take an operator 10 years, working a 40-hr week, to project all the film this camera can expose in one minute.
- ▶ Concern over supplies of chrome, nickel, manganese and other strategic metals is very real but two factors will help keep the picture from getting too black. Starting with World War II NE steels, metallurgists have a lot of experience to work out more substitutes. Also, cold working instead of heat treating of steel will cut down some alloy requirements.
- ▶ Reports of heavy steel stocks in plants of many steel users are not confirmed by recent checks which showed many plants working almost directly from the incoming freight cars. Substantial inventories in manufacturing plants are believed to be isolated cases.
- ▶ Night lighting systems mounted directly on Army Engineer construction equipment cost from \$5.00 to \$300.00, average \$200.00. They permit operations at 85 pct of daytime rates, and have proved more flexible than fixed lighting, according to a recent Offices of Technical Services report.

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Steel Users Fear Price Rise

DO Order Needs Some Changes

More Steel Prices Increased

The Iron Age

SUMMARY

IRON AND STEEL INDUSTRY TRENDS

STEEL users this week are anxiously awaiting the outcome of wage "talks" between the Big Steel and the United Steelworkers. They know that their own material and wage costs will be significantly affected by these talks. The steelworkers, who are asking 23¢ an hr or more, will probably turn down a cost-of-living offer of 5 or 6¢. Steel users know that a big wage increase would mean substantially higher steel prices. If the talks result in an impasse the whole problem of steel wages and prices may wind up at the White House.

Confusion in steel circles over the issuance of DO priorities and their effect on steel mill schedules is rampant this week. This confusion will continue since the order was hurriedly written and left many obvious questions unanswered.

Steel Task Force May Help

Some sources believe it is a makeshift arrangement to tide Washington over until after the elections. Amendments, interpretations and changes will be made many times before the plan becomes workable. Its final shape will be a modified form of controlled materials plan. Industry believes that advice from the steel task force will prove a potent factor in molding the plan into workable shape.

Defense orders are snowballing more every day, although most of them are not yet carrying the DO priority symbol. One steel producer reports that 10 pct of its flat-rolled stainless, 30 pct of its stainless bars and over 30 pct of its electrical sheets are already going into government orders. Besieged by customers who want to know where they stand for next year, they expect to open their first quarter (1951) books next week.

Reports of heavy inventories at some steel users plants appear to have come from mushrooming gossip about a small number of actual cases. Steel stocks of most manufacturers are

far from large. Some are literally working from freight cars and trucks. Others have shut down their plants. Still others have had to cut the number of people on the work force as stocks dwindled.

Report Small Inventories

Most steel consumers contacted by THE IRON AGE say they never did get back to a healthy inventory after the steel strike a year ago. Slashing of quotas this month and next will aggravate this condition. So will the appearance of more defense orders.

Meanwhile, steel sales people are making every effort to get order books cleaned up by the end of the year. To do this some have dropped warehouses from the October schedule. A pipe producer is 45 days to 3 months behind on deliveries of all products. A plate producer is 2 months behind on 96-in. plate. A manufacturer of wire mesh is 3 months behind. These firms have a lot of catching up to do to prevent large fourth quarter carryovers.

Despite efforts to stamp it out, the gray market is flourishing. Some flat-rolled steel has brought as much as 19½¢ per lb (\$390 per ton). Biggest support is coming from small steel users who haven't been able to get enough steel from regular sources. The conversion market is also tighter this week, with ingots and slabs almost unobtainable.

Several Firms Raise Prices

Several more firms have raised prices on some steel products. Jones & Laughlin Steel Corp. has hitched the prices of galvanized pipe and wire products to the price of zinc, causing immediate increases of \$3.00 to \$14.00 a ton. Follansbee Steel Corp. raised cold-rolled strip \$7.00 a ton. A. M. Byers Co. increased wrought iron galvanized pipe \$5.00 a ton. Niles Rolling Mill boosted some flat-rolled items \$5.00 to \$15.00 a ton.

(Nonferrous summary, p. 254)



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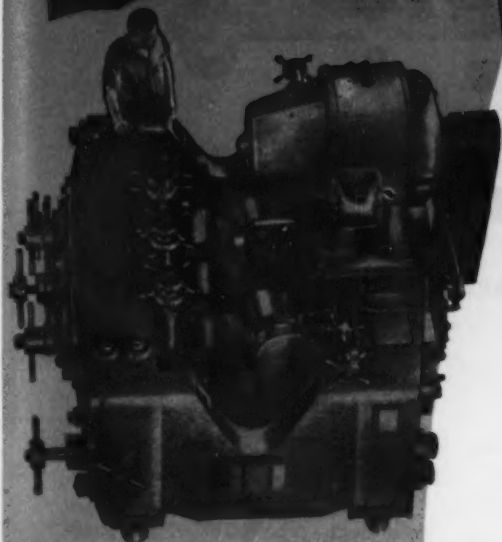
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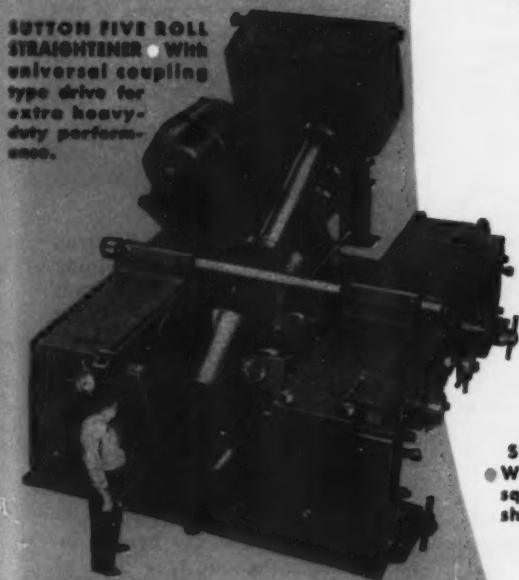
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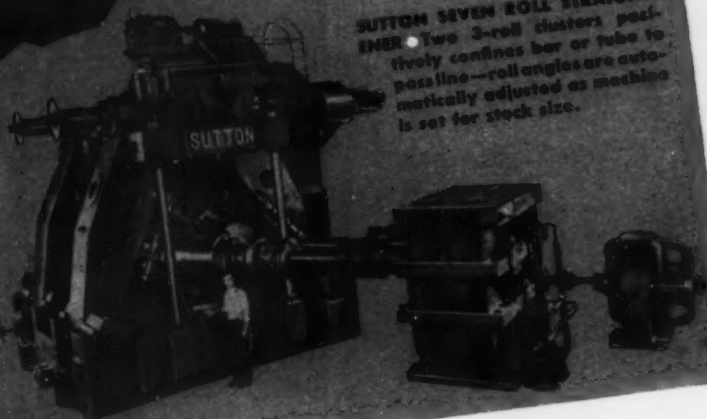
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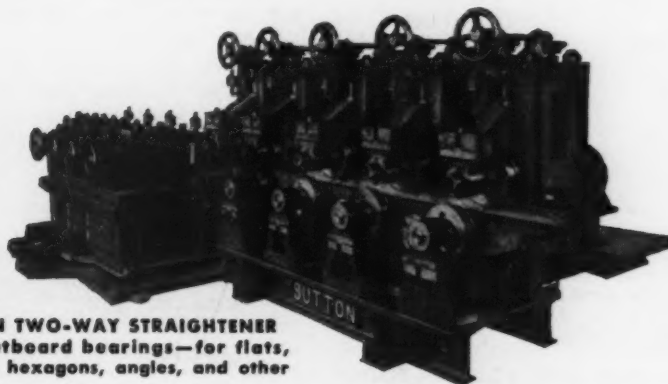
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POLISHING!**



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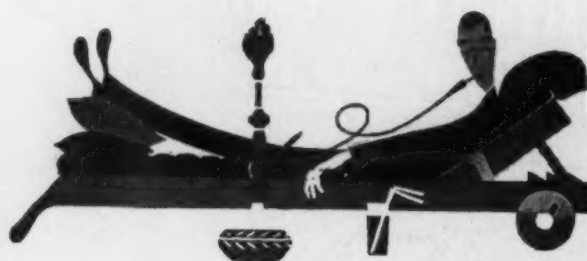
See how Elgin Dymo . . . available in 11 Bureau of Standards grades for any lapping or polishing job . . . will reduce your finishing costs and give you better results at the same time. Just mail coupon below for a free demonstration right in your own plant!

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**INDUSTRIAL PRODUCTS DIVISION
ELGIN NATIONAL WATCH CO.**
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Fatigue Cracks

By CHARLES T. POST

Publicist's Perils

Even when the job of a public relations man boils down to shepherding visiting firemen, it's not all beer and skittles.

Through Bob Reinhardt, chronicler of activities on the West Coast, comes a commentary on a week-long tour by industrial editors sponsored by California's Central Valley Empire Assn.

Wrote the association's John Arthur Reynolds regarding tour arrangements: "We are running into a difficulty here and there like getting elk steaks for one of the breakfasts, but we are sure that the whole thing will be interesting and worth while."

We can see that when civilization moves in, the elk get darn scarce, and recognize that Mr. Reynolds may have to get up early to bag the limit. But unless he comes through with the elk steaks, the editors won't give the Central Valley Empire a line of space. Even the champagne reception and the California Wine Festival Dinner won't help.

Aptronyms

From A. N. Conklin of Welland, Ontario, we have further evidence of the solidity of the U. S. and Canada. Aptonyms grow up there, too.

Reader Conklin gets his honey from S. B. Bisbee. J. Ground is in the real estate business in Toronto. And there's a Toronto garage with this sign over the door:

**USED CARS
MAYBEE MOTORS**

He says that Luck and Wisdom operated a grocery in Orillia, Ont.,

a few years back, "and may still do so"—implying, we gather, that luck and wisdom may not be enough to make a go in business today.

From Grand Island, Neb.: Kenneth Bogus was arrested for passing a forged check.

From Los Angeles: Quong Hi, Wong Low, and Luey Jack, three poker-faced Chinese, didn't have the cards to beat a federal rap of crossing the border illegally.

But the most potent piece of intelligence comes from C. C. Finn, who, scanning the Seattle birth reports, noted that a Mrs. Winchester delivered a baby son. She well could be a repeater, but not an automatic, we hope.

Puzzlers

A medal goes to Reader Schuran of Chrysler's technical training staff as the only person to submit an answer to the problem of the diagonal board in the rectangular room (Sept. 28). He says 17.45 ft is the answer.

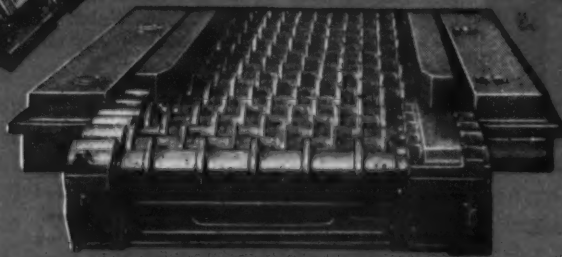
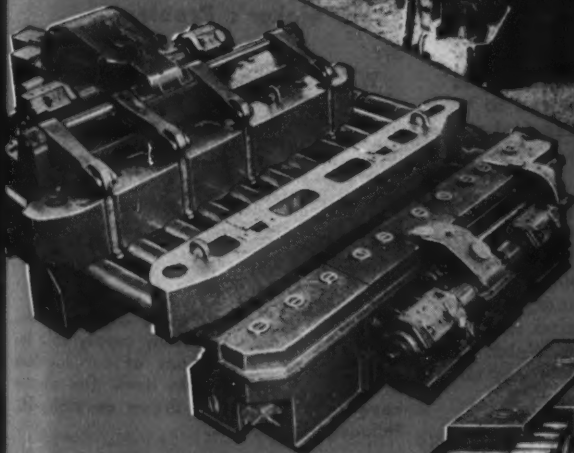
Sidney Reibel of Albert Kahn and A. G. Becker of Chicago both solved the problem of the balls and walls (Sept. 21), but not how to get the balls through the door.

Bob Hatschek of the brains department tosses out this one: A man is rowing upstream at a constant rate relative to the water. He drops his hat overboard but does not notice it immediately. When he eventually notices his loss, he turns the boat around and rows downstream at the same rate relative to the water that he rowed upstream. It requires 10 min to get to his hat, which had traveled exactly one mile since he lost it. What is the rate of the river's current in mph?

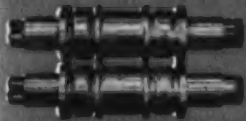
Plate Mill Tables



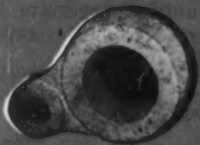
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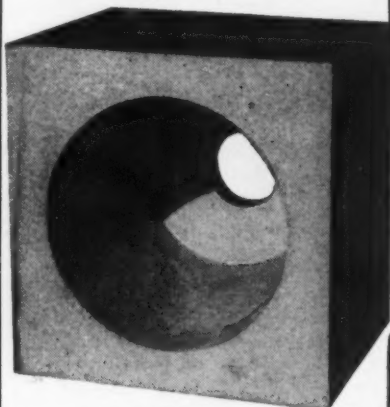
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REMMEY

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Dear Editor

Letters from Readers

Bully, Eh What?

Sir:

I am just a simple and possibly unimaginative Britisher—or if you prefer it—a Limey. I do not think I am devoid of humour or slow in the uptake by our standards. Your people and ours speak the same language except for a few minor differences. You may drop the “u” in “favour” and use a word—“gotten,” which we have almost discarded.

Some of my forbears migrated to your country before and since I was born and they and their issues were or are 100-per cent American. I have many friends on your side whom I met during the last War and found no serious difficulties in our common tongue. But, would someone, in elementary fashion, put me wise to the funny bits which are presumed to be incorporated in your regular feature, “The Bull of the Woods”?

I study these cartoons every time they appear but they leave me stone-cold and I wonder how many, if any, of your readers are as dense as I am. Your cartoonist bears a name which is very common in the country of my birth—Wales. I do not mind if it is explained to me either in Welsh or British English, so long as I am not missing anything, goddarn it!

W. J. ALLEN

Cheam, Sy., England

The Englishman's inability to see any humor in the “Bull of the Woods” is an old problem which has already been aired in the British press. See the “British Steel-maker,” Dec. 1949, for an article featuring THE IRON AGE humor. Some of it gave the British quite a laugh—but the “Bull” left them cold. We've never figured it out. Perhaps you can come up with a new theory.—Ed.

Termite Trouble

Sir:

In the Sept. 28 issue Fatigue Cracks column there is an item which refers to an editorial by Tom Campbell last Apr. 20 regarding termites.

If at all possible, I would like to get a copy of the editorial, as a friend of mine is having difficulties along this line . . .

A. O. JOHNSON
Secretary

*Burgess-Norton Mfg. Co.
Geneva, Ill.*

Tough Question

Sir:

Could you tell me or state where I could find out approximately how many man hours are required to build a car. To have significance, of course, this figure should indicate whether this was direct automobile factory man hours, whether it included indirect labor, and whether it included the time of purchased parts, such as textiles, batteries, tires, etc.

K. B. JELLY
Senior Industrial Engineer
Aluminum Co. of Canada, Ltd.
Arvida, Quebec

We have never seen any accurate information on the number of man hours required to build a modern automobile. Even if every automobile factory made all its own parts, there would be enough difference in design and processing to make any such figures practically meaningless.

Of course, the big stumbling block is that a large quantity of parts are bought outside. This is one reason why you never see any figures of the kind in print. Another reason is that it would enable competition to estimate costs with uncomfortable accuracy. The UAW-CIO has been working for years to obtain such information and they have told us quite frankly that their efforts have been unsuccessful.—Ed.

Tooth Maker's Problem

Sir:

We are hoping that you may supply us with the names of some companies whom we may contact to make us some very small Monel taper pins. Our previous supply was made by the Waltham Watch Co. of Waltham, Mass., but they have since been closed.

M. CHAREN
Universal Dental Co.
Philadelphia

International Nickel Co., 67 Wall St., New York 5, could probably supply this information, or perhaps one of our readers is equipped to handle the item. The above company's address is: Brown at 48th St., Philadelphia 39.—Ed.

Ruhr Reader

Sir:

On p. 108 of the June 22 issue of THE IRON AGE, there is a brief article entitled “Steps in Steel's Progress Outlined in Institute Report.” Could you tell me in which periodical this recent report of the American Iron and Steel Institute had been printed? Or does it involve an independent publication in book form? As a reader of your magazine of long standing I would very much appreciate if you would give me this information as soon as possible.

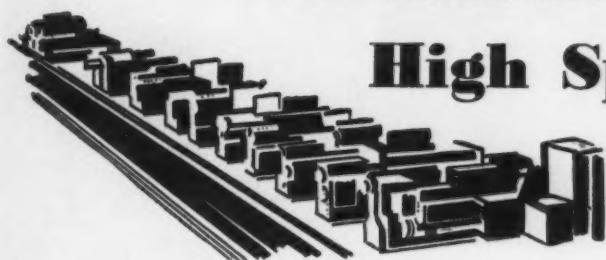
H. TAMME
Librarian
Essen, Germany

A fuller version of the story appeared in the June, 1950 issue of “Steel Facts,” published by the American Iron and Steel Institute.

The IRON AGE version is a condensation of the “Steel Facts” story; its content is substantially the same.—Ed.

MACHINE TOOL

High Spots



Sales
Inquiries
and Production



By W. A. LLOYD

Some NPA Clarification—Status of priorities, a big and controversial unknown in the machine tool industry's production picture, was clarified somewhat this week when National Production Authority issued Reg. 2.

A press copy of Reg. 2, dated Oct. 3, under Section 11.6, para. A, reads, "A person who has received a rated order may not extend the rating to get material for plant improvement, expansion or construction or to get machine tools or other items which he will carry as capital equipment, or to get maintenance, repair or operating supplies."

A person is defined as "any individual, corporation, partnership, association or any other organized group of persons and including any agency of the U. S. or any other government."

May Extend Rating—However, the Defense Dept. or the Atomic Energy Commission may apply this form of priority certification under a prime contract for materials, machine tools, or other equipment needed for the defense program. The prime contractor

may extend it on his order for materials only, not on his order for machine tools or capital goods.

This priority rating may be extended by an authorized buyer only to buy materials for a defense contract or sub-contract or to replace inventory used for the rated order, provided he replaces it within 3 months. It may not be used for plant expansion, to buy machine tools or other capital equipment or for maintenance, repair or operating supplies.

Regulation in Making—According to industry sources, a regulation is now in the making to permit the Dept. of Defense or AEC to reach down to a sub-contractor in a case where production of strategic material is being curtailed for lack of a machine tool and certify the machine for him.

It is rather apparent that NPA anticipates no trouble with machine tools—only materials.

Priority Explanation—In the industry there are two schools of thought on priorities. A consensus holds that voluntary cooperation will handle the present dilemma of delivery, but a few feel that priorities would make it a lot easier to explain to a good customer why delivery of his machine must be delayed in favor of a newcomer with a government contract. Some of the big customers are asking for certified delivery; that is, a guarantee of delivery signed by an officer of the company.

Drop from August—Trade reports indicate that the index of

new orders for September will show a drop from August, but will top the July figure. However, at least two major companies of those contacted reported the biggest week since the end of the war.

In one sales sector, a 10 pct price increase on a major line of lathes was reliably reported. Some observers see this as a straw in the wind, with others to follow. Higher production costs and a definite reluctance on the part of many customers, particularly big customers, to accept escalator clauses, are reported reasons for the increase.

Shortages Mount—The shortage of materials and components was growing this week, with bearings and electric equipment in tight supply. These items, in addition to sheets, plate and cold-finished bars, are slowing production in a number of shops.

Up in the air this week are foreign shipments. A list of strategic items is being prepared. To receive any one of the machine tool items on this list from the U. S., the nation involved must refuse to ship any of the strategic items to Russia. Chief problem at the moment is to compile a list that is satisfactory, or somewhat satisfactory, to all concerned and still strategic.

Big Job in Washington—In Toronto, David Ayr, president of Hendey Machine Co., Torrington, Conn., told members of the National Machine Tool Builders' Assn. at their 49th annual meeting that the industry's big job today is in Washington as advisers and consultants to officials.

Mr. Ayr, also president of NMTBA, urged that the industry help Washington officials gain a true understanding of the industry's productive capacity and of the time factor and other factors involved in increasing output above present levels.

He warned that, if tentative production schedules were suddenly activated, the industry faces the danger of again being labeled the "bottleneck of war production," as it was in the early part of the last war.

The explanation of the preference for zinc among all die casting metals is a simple one—zinc alloys provide the greatest number of desirable mechanical properties and casting characteristics at the lowest cost. The specific advantages of zinc die castings have been emphasized in our advertisements in these pages for the past year. If you missed them we will be glad to send the complete set to you.

We've been telling You in print . . .

but there may be many questions on zinc die castings we have left unanswered. For that reason we will welcome the opportunity to talk with you—in person—at the National Metal Exposition in Chicago. We will have many zinc die castings—and pressed powder parts—on hand, as well as many of the finished products in which they are used.

Now-You can see for yourself

Visit with us at

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why ZINC DIE CASTINGS are the most widely used . . .

HOW SMALL—HOW BIG?

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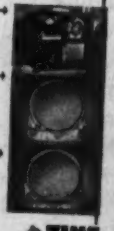


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PUBLICATIONS

Jig Borer

Design and operational features of the Moore No. 2 jig borer, which accurately locates holes within 0.00025 in. over a range of 10½ x 16½ in. for drilling, boring, reaming and spotting, are described in a new 24-p. catalog. Numerous action photographs illustrate the complete jig borer operation; setting up work with the hardened, ground and lapped lead screws, adjusting the infinitely variable spindle speeds by push button controls, one-shot lubrication, quick tool changes and moving the quill housing. Special sections are devoted to descriptions of the power plant, depth measuring devices, spindle, quill and spindle head as well as the Moore method of measuring with accurate lead screws. *Moore Special Tool Co., Inc.*

For free copy insert No. 1 on postcard.

Tool & Die Steels

Ziv carbon alloy high speed tool and die steels are listed in a new 88-p. catalog. In addition to complete specifications, recommended applications and heat treatments sections of the booklet contain handy engineering data such as hardening and tempering colors, charts on melting points, temperature and hardness conversion tables, and weights of bar stock and flats. An extensive discussion of heat treating is included. *Ziv Steel & Wire Co.*

For free copy insert No. 2 on postcard.

New Oil Booklet

A new 12-p. illustrated booklet describes Sunvis H.D. 700 oils. It will be of interest to production men in plants where contamination and rust are a problem and where

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bearings are operating under heavy loads. The booklet describes how these heavy duty oils perform each of these functions in circulating and hydraulic systems, compressors, and gear boxes. *Sun Oil Co.*

For free copy insert No. 3 on postcard.

Drilling Machine

The Cleereman layout drilling machine, introduced to meet requirements where the ultra-precision of a jig borer is not necessary, is described in a new 4-p. folder. The machine, designed specifically for efficiently handling jobs that do not require tolerances closer than 0.001 in. per ft, claims economy and the utmost of operator ease, as explained in the bulletin. Specifications are listed. *Cleereman Machine Co., Bryant Machinery & Engrg. Co.*

For free copy insert No. 4 on postcard.

Centrifugal Pump Guide

Economical pumping units for every industry are cataloged in a new 16-p. booklet entitled "Handy Guide to Selection of Centrifugal Pumps." A wide variety of units are indexed in this bulletin including close-coupled, pedestal, double suction single stage, multi-stage, self-priming, fractional horsepower, coolant and circulating, fire, process, solids handling, marine, rubber-lined, paper pulp, sewage, axial and mixed flow pumps. Head capacity charts and tables for various types of the pumps are given

along with data on sizes, capacities and construction features. *Allis-Chalmers Mfg. Co.*

For free copy insert No. 5 on postcard.

Packaged Power Unit

Complete information on Gearmotors, Motogears and separate helical gear drives, 1 to 75 hp, is given in a new 16-p. booklet. The new Motogear packaged power unit, consisting of a compact, enclosed helical gear drive with separate standard motor, is flexibly coupled and mounted on one welded steel base plate, as shown in the bulletin. *Link-Belt Co.*

For free copy insert No. 6 on postcard.

Fastening Specialties

Southco drive rivets, adjustable pawl fasteners, anchor nuts and screw type fasteners are shown and described in a new 6-p. folder. These and other items covered in the bulletin are designed to do a better fastening job at a lower installed cost, especially in applications presenting unusual problems. *South Chester Corp.*

For free copy insert No. 7 on postcard.

Short Run Dies

Precision cast dies for producing experimental or short run parts are described in a new 4-p. bulletin. Main advantages of Allite dies, cast from any formula of zinc alloy, are their low cost as compared to steel because they elimi-

Turn to Page 273

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WARREN, OHIO

October 12, 1950

37

NEW

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ment is started and is assured of complete safety through automatic locking of the valve in any position. The valve is designed for pressure differential in both directions. A full scale position indicator shows the degree to which the valve is opened or closed. Valves fit all standard pipe flanges. *F. J. Stokes Machine Co.*

For more data insert No. 24 on postcard, p. 35.

Toolroom Lathe

Handles toolroom turning within its 12½-in. swing and 20-in. centers.

A new precision toolroom lathe is recommended for sensitive instrument work and heavy-carbide cutting. Contributing to its power are: A 40 pct heavier weight of



4000 lb; a headstock back-gearing at speeds ranging from 22 to 400 rpm, and a bed with 12¾ in. wide steel ways. Precision is due to a free spindle by direct belt drive operating at infinite speeds up to 3600 rpm; collets mounting directly in spindle; hardened and ground feed screws; anti-friction bearings; and a gear box providing 72 feeds and 84 threads. Pushbuttons control the variable speed drive and the electric carriage. *Rivett Lathe & Grinder, Inc.*

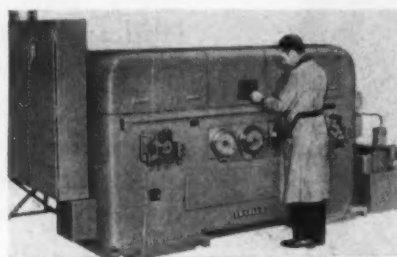
For more data insert No. 25 on postcard, p. 35.

Two-Wheel Form Grinder

For high production processing of jet engine aircraft blades.

The machine uses 24-in. diamond dressed grinding wheels that finish both sides of the root form simultaneously. Dovetail or pinetree forms of various sizes may also be ground. Automatic functions and simple controls make it possible for

unskilled operators to do precision work. The blades are held in fixtures that are removable from the machine and may accommodate one or two blades. The automatic machine cycle moves the part to the



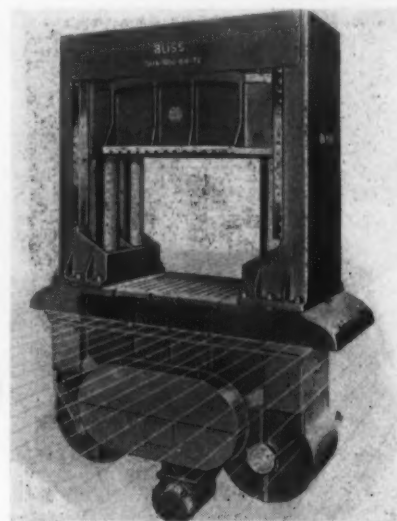
grinding wheel, reciprocates it between the wheels for a predetermined number of strokes and speed. *Ex-Cell-O Corp.*

For more data insert No. 26 on postcard, p. 35.

Forming Presses

Feature easy accessibility of parts, and minimum service requirements.

The new line of presses is designated SU-4 after the J.I.C. system of single action, underdriven, four-point presses. Sixty-three standard sizes have been engineered with capacities ranging from 300 to 3000 tons and bed areas from 72 x 48 in. to 300 x 108 in. (R to L by F to B).



All bearings are arranged to permit the shafts to be dropped straight down without the necessity of pulling. Presses are double geared, with the driving eccentrics cast in-

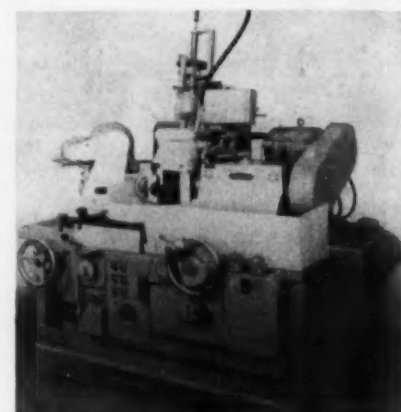
tegral with the main drive gears. All gears can be arranged to run in oil. The fast acting Bliss single disk pneumatic friction clutch is standard equipment. The new presses were developed with the cooperation of automotive engineers for assembly-line manufacture requiring severe round-the-clock usage. *E. W. Bliss Co.*

For more data insert No. 27 on postcard, p. 35.

Valve Grinder

High speed production with semi-automatic operation, fine finish.

This new machine grinds the faces of automotive and aircraft type valves having face angles of 0° to 62½° with face diameters of 7/16 to 3½ in., and with stem diameters up to ¾ in. The grinding cycle functions under semiautomatic control. Movement of a single lever clamps the workpiece in the work head collet, starts the grinding cycle, rotation of the



workpiece, and coolant flow. A simple adjustment provides for an ultra-fine feed rate in the final automatic feed stage. Spindle reciprocation contributes to quality of finish and improved wheel cutting action. Termination of the grinding cycle is automatic by means of a pre-set electric timer. The work head unit swivels through a 67° arc on a swivel plate having micrometric adjustment. Spindle of the work head unit carries a draw-type, hydraulically operated chuck for holding the workpiece. *Norton Co.*

For more data insert No. 28 on postcard, p. 35.

Metal Shaper

For all-around tool-and-die or continuous operation.

The 7-in. precision metal shaper has four speeds: 40, 70, 115, and

Turn to Page 275



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if you know how*

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October 12, 1950

137

Iron Age *Introduces*



PAUL W. SOMMER, vice-president, Keystone Steel & Wire Co., Peoria, Ill.



JOSEPH J. JEFFREY, vice-president in charge of personnel, Great Lakes Steel Corp., Ecorse, Mich.



ROBERT H. EVANS, executive assistant to the president and executive committee, Olin Industries, Inc., East Alton, Ill.

S. S. Stewart named vice-president in charge of purchasing for **MACK MFG. CORP.**, New York, previously purchasing agent for the manufacturing division of Air Reduction Sales Co., New York.

Henry A. Federa elected secretary, general attorney, and a director of the **ORINOCO MINING CO.**, New York, formerly an attorney for U. S. Steel Corp. of Delaware.

Walker A. Williams, Ford Div. sales manager for the **FORD MOTOR CO.**, Dearborn, appointed vice-president—sales and advertising, to fill the vacancy made by the resignation of **J. R. Davis**. **John Dykstra**, general manager of the general manufacturing division, appointed vice-president—manufacturing group, to head six newly created manufacturing divisions of the company.

Ralph L. Robinson becomes vice-president of the Brake Shoe and Castings and Southern Wheel Divisions of the **AMERICAN BRAKE SHOE CO.**, Chicago. **Edward R. Anderson**, formerly district sales manager, becomes vice-president of the Brake Shoe and Castings Division, San Francisco.

George D. Ramsay resigned his office of vice-president and technical advisor for the **LONE STAR STEEL CO.**, Dallas. He plans to resume his practice as a consulting engineer on the West Coast with offices in Los Angeles.

Worrell F. Pruden, appointed assistant chief engineer **COLUMBIA STEEL CO.**, U. S. Steel Corp. subsidiary, San Francisco, previously chief engineer for Consolidated Western Steel Corp., Los Angeles.

William C. Hookway, Jr., named assistant to the chief engineer of the **COOPER ALLOY FOUNDRY CO.**, Hillside, N. J. **James Zeigler** succeeds Mr. Hookway as sales representative for the New Jersey territory.

R. H. Wright named general superintendent of the **ATLANTIC STEEL CO.**, Atlanta, previously assistant superintendent of the wire mills. **R. E. Bobbitt** made superintendent of maintenance, and **W. R. Potts** made chief engineer.

A. D. Hodge named sales manager of the Industrial Sales Div. of the **WEATHERHEAD CO.**, Cleveland.

E. W. Kahle advanced from assistant treasurer to treasurer for **HEYL & PATTERSON, INC.** and **E. E. Bauer** made a contract engineer.

Russell A. Clayton made controller of **KAISER ALUMINUM & CHEMICAL CORP.**, Oakland, Calif. He takes the place of **Donald E. Browne** promoted to vice-president and treasurer.

William F. Winemiller, formerly refractories engineer in the Detroit area, has been named chief sales engineer, Refractories Div. of the **NORTON CO.**, Worcester. **Eugene A. Fischer** made refractories engineer for New England and part of New York State and will make his headquarters in Worcester. **Murner E. Thor** takes over the territory consisting of eastern Canada and part of New York State and will work out of Buffalo. **David G. Bolon** appointed refractories engineer for part of Indiana and Michigan with headquarters in Detroit.

Joe H. Morin, formerly field contact man for the distributors' division of **SHURE BROS., INC.**, Chicago, named sales manager of the distributors' division.

Oscar von Seeger, export representative, named to the new post of assistant divisional manager of the Export Sales Dept. of the CATERPILLAR TRACTOR CO., Peoria, Ill. He has been with the company since 1927 serving in various capacities.

D. F. Scales has been promoted from dealer and export sales manager to general sales manager with SOUTHERN STATES IRON ROOFING CO. Replacing Mr. Scales as export sales manager is W. A. Blun, promoted from assistant dealer sales manager. Leo D. Sheridan becomes Atlanta district sales manager, Herbert C. Warwick, Raleigh district sales manager, Charles A. Rea, Birmingham district sales manager, and John P. Starnes, Nashville district sales manager.

Egbert A. Cabbie appointed to the post of market research analyst of the RIVERSIDE METAL CO., Riverside, N. J.

A. W. Anderson was appointed Pittsburgh district sales representative for the OHIO STEEL FOUNDRY CO. He replaces Harry S. Ransom, who is retiring.

Walter F. Craig, Jr., formerly supervisor, Ferrous Metals Research, Armour Research Foundation, joined the CLIMAX MOLYBDENUM CO., Chicago, as metallurgical engineer.

J. D. Campbell, formerly superintendent of construction of ERIE FORGE CO., Erie, Pa., becomes general superintendent of construction, maintenance and repairs.



THOMAS J. READY, JR., vice-president, Kaiser Aluminum & Chemical Corp., Oakland, Calif.

Iron Age *Salutes*

MICHAEL V. O'DONNELL

"MIKE" O'DONNELL'S career is an American success story. The fact that the steel spring industry was his life's work may be only incidental. Mike would have made good peddling fur coats in equatorial Africa.

When Mr. O'Donnell retired last year as superintendent of Crucible Steel Co.'s Spring Plant he could look back upon more than 50 well-spent years in the steel spring industry. He left behind him many ideas and several patents that have meant better riding for a nation that grew up on wheels.

Mr. O'Donnell was orphaned at an early age. While other kids were having fun, he had to work. His first steel mill job was pulling up doors of openhearth furnaces. He went to work full time in 1895, before he was 16, in the Spring Works of the A. French Spring Co., Pittsburgh.

Later he became inspector of valve springs and other special items. Then he became ill for several months. When he returned, his job was gone and he had to begin again as a laborer unloading steel. But he was soon back in the plant, worked his way into the office, meanwhile studying business methods, coil and leaf spring formulas, and engineering. He took night classes at Carnegie Institute of Technology, special courses in mechanical engineering and heat treating.



When the A. French Spring Co., was sold to the Railway Steel Spring Co., Mike was ready. Appointed superintendent of the Spring Plant in 1900, he held that job until 1909, when G. M. Black, general superintendent of Crucible Steel Co., selected him to open and operate the large spring plant of Crucible.

By that time, Mike was a recognized expert, consulted by the transportation field. His patents cover design and methods of manufacture.

Since his retirement, Mr. O'Donnell has been a part-time consultant. Most of his time, however, is spent with his wife, Alice, their eight children, and five grandchildren.



S. S. "BERT" INCH, vice-president in charge of sales, Kaiser Aluminum & Chemical Sales, Inc., Oakland, Calif.



H. G. DILLON, vice-president in charge of sales, Heyl & Patterson, Inc., Pittsburgh.



EARL C. HARTMAN, supervisor of the coke oven refractories division, Harbison-Walker Refractories Co., Pittsburgh.

John G. Pufalt, formerly district manager of sales in Moline, Ill., now district manager of sales, St. Louis territory of the **GRANITE CITY STEEL CO.**, Granite City, Ill.

H. Allen Hall resigned as secretary of the **FERRY CAP & SET SCREW CO.**, Cleveland. **Charles B. Lansing, Jr.**, formerly treasurer and assistant secretary now secretary and treasurer, and **William H. North** assistant secretary.

C. R. Benson appointed manager of sales for the Oakland, Calif., transformer plant of the **GENERAL ELECTRIC CO.** He was formerly assistant manager of the Distribution Transformer Sales Div. in Oakland and has been with the company since 1926.

Clarence E. Lindstrom, formerly manager of distributor operations, named western sales manager for **PHILCO CORP.**, Philadelphia, replacing **Cliff S. Bettinger** who recently retired.

L. Dean Fowler has been slated as manager of sales for **GENERAL ELECTRIC'S** control division at Schenectady. He had formerly been sales manager for the company's San Jose motor division.

William E. Hines, assistant to the general freight traffic manager, **SANTA FE RAILWAY**, Chicago, retired. He will be succeeded by **John P. McElree**, assistant to freight traffic manager, Gulf, Colo. and Santa Fe Railway, Galveston, Tex.

John F. Muldoon, formerly assistant to the president of the St. Louis Car Co., joined the **PRICE IRON & STEEL CO.** Chicago, in their executive department.

Carl Dittmar, manager of the Cleveland district sales office, Electrochemical Dept. of the **E. I. duPONT de NEMOURS & CO.**, recently retired. He will be succeeded by **Albert R. Tucker**, who was manager of the Cleveland office while Mr. Dittmar was on a leave of absence.

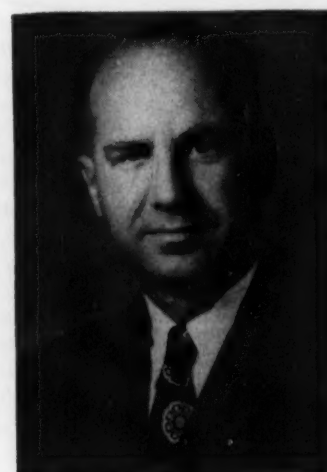
George H. Main assigned as a sales representative to the Buffalo district office of the **ALLIS-CHALMERS MFG. CO.**, Milwaukee. He joined the company's graduate training course in 1948.



EDMOND A. NEAL, domestic sales manager, Nicholson File Co., Providence.



B. A. ROSE, vice-president in charge of engineering, Heyl & Patterson, Inc., Pittsburgh.



JOHN S. HAWLEY, marketing manager, Shakeproof Inc., Division of Illinois Tool Works, Chicago.



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October 12, 1950

141

On the ASSEMBLY LINE

AUTOMOTIVE NEWS AND OPINIONS

Overtime pay squabble nearly closes Ford operations . . .
Body engineers to discuss light cars . . . Estimate five cars
per dealer . . . Sees 90 to 98 octane gas coming.



By **WALTER G. PATTON**

Ford Labor Trouble—Running a steel mill in conjunction with a big auto plant presents many operating difficulties. The problem of establishing efficient rolling schedules is troublesome enough. In Detroit where Ford steelworkers are members of the Auto Workers Union the labor problem is even more perplexing. Failure to find a satisfactory answer to its labor problems precipitated a strike in the Ford steel mill last week which nearly shut down the company's operations throughout the country. As this is written, the strike appears to be broken, largely as the result of energetic efforts by top UAW-CIO officials.

With few exceptions, automobile plants in Detroit operate on a 5-day week. Where Saturday or Sunday operations are required in some de-

partments, workers are paid time and a half for Saturday and double time for Sunday even though they may not have worked 40 hours previously. Similarly, Ford has been paying time and a half for Saturday work and double time for Sunday in its steel mills. In addition to a competitive base pay rate, Ford recently added an 8¢ cost-of-living adjustment. A premium of 5¢ an hour is now being paid for 7-day operations. In addition, Ford pays an incentive bonus—believed to amount to as much as 25 pct.

Decision for Company—During its negotiations with the union, Ford argued that its overtime labor costs in the steel mill were prohibitive. A committee was appointed to study the problem but was unable to reach an agreement. The case went to the impartial umpire who decided in favor of the company. Last July, Ford started to put the umpire's ruling into effect. The strike occurred in the rolling mill, the last Ford department affected by the ruling.

The steel situation in the automobile industry is probably worse today than at any time during the entire postwar period. Most auto plants report they are losing steel inventory. September deliveries of steel were, generally speaking, disappointing. At the moment, October looks a little better. The most serious loss of inventories has been in warehouses which have been unable to replace their stocks. Losses

of warehouse inventory as high as 80 pct have been reported. Small parts plants which use large amounts of warehouse steel have been particularly hard hit. This has forced them to come running to the automakers for steel. Neither the parts supplier or the auto plants are happy in such a situation. Many conscientious managers will do this only as a last resort.

Shortage Accentuated—During most of the postwar period a few steel items were in normal supply. At various times, alloy bars, carbon bars in large sizes and some cold finish bars carried normal lead times. Today, every item on the entire steel list is short, including wire rope. Stainless steel, which went begging a few months ago, is probably the tightest item on the entire list.

Past history has shown that automobile companies always operate longer than their steel supplies would seem to permit. Nevertheless, many steel buyers and suppliers here are now inclined to the opinion that the auto industry is facing today its most critical period insofar as steel supply is concerned.

Civilian Production—Loose talk that automobile production would be cut off entirely seems now to be subsiding a little. In an address last week before the Syracuse Automobile Club, A. vanderZee, vice-president in charge of sales at Chrysler Corp., expressed a view

which seems to be gaining public favor. He pointed out that the military program now contemplated provides for a substantial production of automobiles and trucks for the civilian market.

Light Car Leaders—Whatever may happen to 1952 model introductions, auto stylists and body engineers are moving steadily ahead with their plans. Probably the most important convention in the history of the American Society of Body Engineers will be held at the Rackham Bldg., Detroit, Nov. 1 to 3.

The light car will be a major topic of conversation. Discussion leaders will be George Romney, vice-president of Nash-Kelvinator Corp., and Clay Bedford, vice-president of Kaiser-Frazer Corp. Both Nash and K-F are convinced that an excellent market exists for small cars. At the moment, these producers stand alone in this belief. It still looks like the independent producers will have to carry the ball for the light car until the Big Three producers are convinced.

French Jet Car—Jet powered cars continue to make news. Last week a report out of France credited a jet motor with 40 miles to a gallon of Diesel oil at a speed of 82 mph. The powerplant, including the turbine, is said to weigh only 125 lb. The car has no gearbox. The motor is reported to operate in reverse by inverting the flow of air into the turbo compressor pipes.

There are no present indications that Detroit automotive engineers are seriously considering a jet-powered passenger car. In the past, reports in the news frequently have confused jet power with gas turbines. Despite the encouraging figures contained in the dispatch, high fuel consumption is one of the serious obstacles confronting engineers who would like to see gas turbines on the highway.

Willys Backlog—Since the end of June, Willys-Overland Motors has doubled its unfilled orders. A report for the fiscal year ended Sept. 30, issued by Ward M. Cana-

day, chairman and president, indicated that unfilled orders for commercial and military engines and vehicles amounted to \$93 million. Willys also reports substantial reductions in dealers' stocks who had only 2.5 vehicles on hand as of Sept. 30. Willys executives estimate the average dealer stock for the entire industry is five cars.

Octane Cutback—There's good news for champions of the high compression engine over the long range, W. M. Holaday, director of Socony-Vacuum Laboratories, told the SAE in Detroit last week. The road immediately ahead, Holaday indicated, is not so promising since the industry will have to cut back on fuel octane starting next month. The cutback is necessary, Holaday explained, to meet the growing needs of the armed services. On the basis of present known developments, the fuel restrictions may well continue through 1951.

The long range outlook, Holaday said, is that within the next 10

years regular gas will be pushed up to 90 octane and 98 octane premium gasolines will be available. (These fuels, if available, will accommodate compression ratios up to 12.5 to 1 with the present combustion chambers.)

An engineering trend that will bear watching is the possibility of decreasing the sensitivity of engines to fuel by redesigning the combustion chamber.

GM Stock Splitting—General Motors has recently split its stock 2 for 1. At Boston last week, Hugh Ferry, president of Packard, indicated his company is considering a reversal of this procedure. A proposal may be submitted to Packard stockholders next April, Ferry explained, in which Packard stockholders will be asked to exchange five shares of their present stock for one share of new stock. Such a move would reduce the number of Packard shares outstanding from 15 million to 3 million.

THE BULL OF THE WOODS

By J. R. Williams





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WEST COAST PROGRESS REPORT

Digest of Far West Industrial Activity—By R. T. REINHARDT



Well Tooled—More than 2 pct of all metalworking equipment in the country is located in the Los Angeles area according to the Los Angeles Chamber of Commerce survey. The study of production potential of southern California metal fabricating plants found there had been an increase of 300 pct in number of machine tools since the outbreak of World War II. Current reports show 45,000 machine tools in the area, more new equipment of this type than in any of the 18 largest industrial centers of the country.

From 2000 of the 3000 questionnaires mailed out it was determined that only 22 pct of the equipment in the Los Angeles area is 10 or more years old. Comparative figures reported were: Boston, 47 pct of the equipment is more than 10 years old; Chicago, 40 pct; San Francisco, 42 pct; and Detroit, 51 pct.

Tighter Than Light—Western steel users who converted to aluminum when steel was hard to get now find themselves caught squarely in the middle on both shortages.

Principal bind among manufacturers of store fronts, window frames and similar products comes because of the unavailability of large tonnages of extruded products. One of the largest users of aluminum extrusions in the San Francisco area reports his allotments being steadily reduced and all deliveries far behind schedule. Another is aggressively soliciting identifiable aluminum scrap which he

can trade in 10,000 lb lots to his supplier on a pound for pound basis of finished extrusions.

One San Francisco manufacturer of kitchen cabinets and sinks who had been using aluminum for trim was recently seriously considering switching to stainless steel, but after investigating availability of that material he resigned himself to continue the use of aluminum even on a restricted basis.

All aluminum fabricators appear resigned to reduced allotments and slow deliveries. Aluminum sheet has not tightened up as much as extrusions. In the West the only producers of extrusions are Reynolds Metals Co. at Phoenix, Ariz.; Harvey Machine Co. at Torrance, Calif., and Alcoa at Vernon, Calif.

Kaiser Aluminum & Chemical Corp. at Trentwood, Wash., which produces aluminum sheets but no extrusions, reports airplane manufacturers are getting more than one-fifth of that company's production whereas only 7 pct was going into aircraft sheets before the Korean War.

Production Expansions Not Adequate—Western aluminum users are critical of the government's attitude toward Alcoa in clipping that company's expansion wings and though pleased with the increases in production of primary aluminum by Kaiser at Mead, Wash., and the anticipated new pot lines of Harvey Machine Co. for which power has been authorized at Kalispell, Mont., they consider this increased produc-

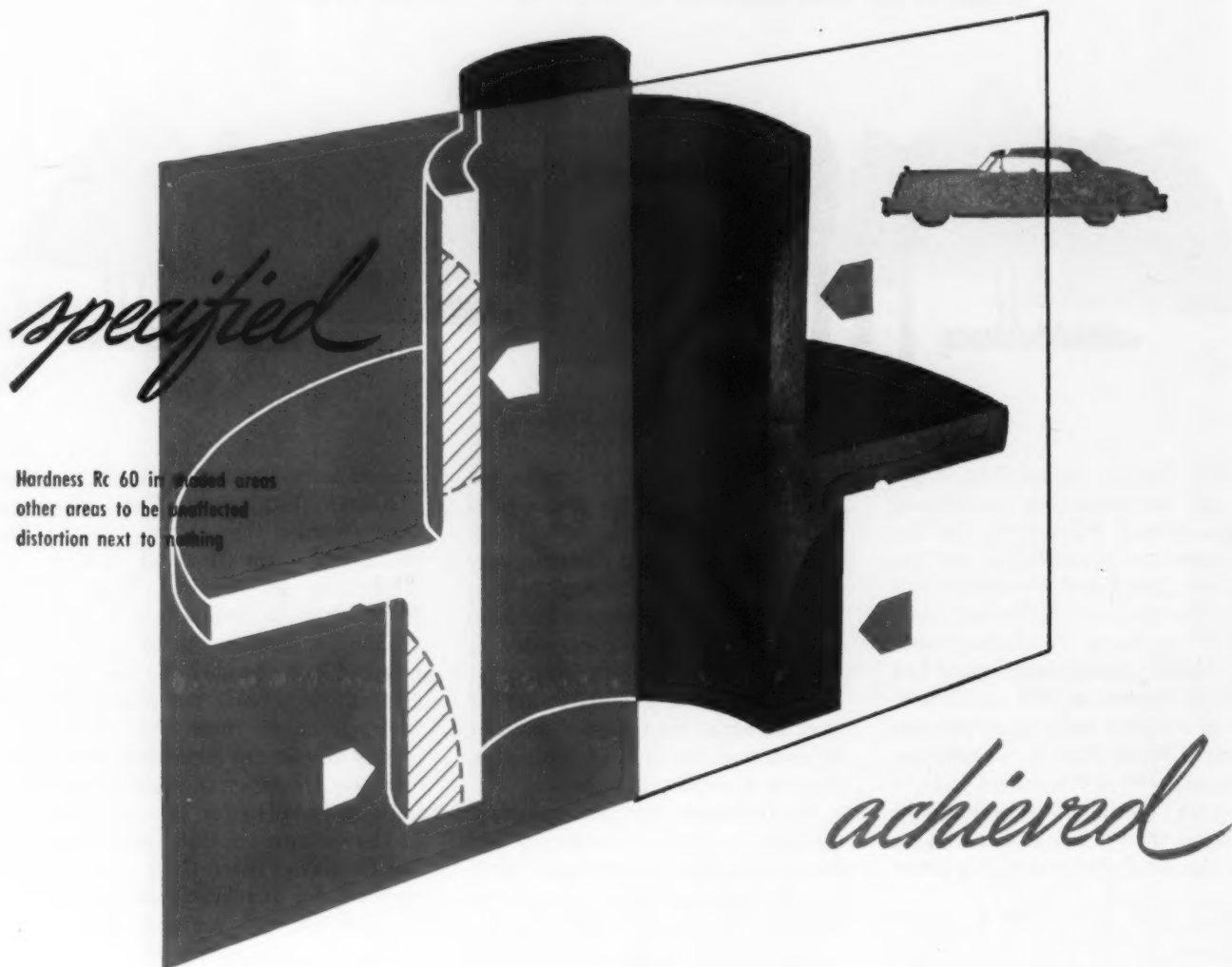
tion "a mere drop in the bucket."

Kaiser Engineers, Inc., have been awarded the contract for the \$3,700,000 expansion of Kaiser Aluminum & Chemical Corp. at Mead which is in addition to a \$2 million expansion program announced in September for the addition of the seventh pot line which was purchased from the government's old plant at Riverbank, Calif. The new construction includes nine buildings needed for the operation of the seventh pot line. Bethlehem Pacific Coast Steel Corp. has the contract for furnishing and erecting 1100 tons of structural steel.

New Location Sought—As yet Kaiser Aluminum has not found a location for the other pot line it purchased from the government where firm power can be assured. There seems little likelihood of the Bonneville Power Administration being in a position to guarantee firm power for the operation of this line for the next 4 years. Foreign aluminum in the form of ingots has been offered to western foundries and extruders at prices considerably higher than prevailing domestically. Last week Japanese aluminum ingots 99.5 pct pure were being offered in Los Angeles at 25¢ a lb plus 2¢ freight as against the current domestic price of 19¢ per lb.

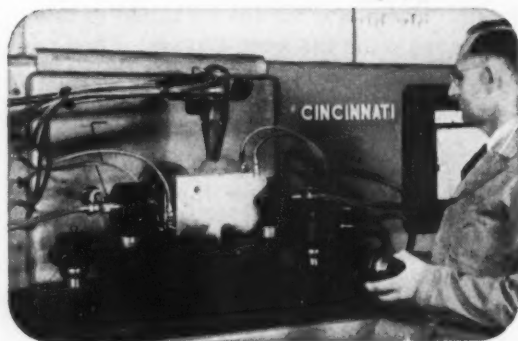
So far as can be learned there have been but few takers of this imported metal although large quantities of aluminum have been offered by importers representing foreign producers.

another part for a torque converter transmission



Hardness Rc 60 in shaded areas
other areas to be unaffected
distortion next to nothing

see this flamatic hardening job in action
at the Metal Show



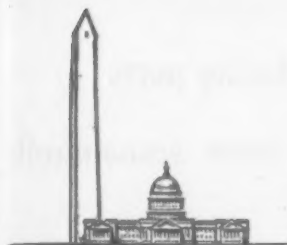
Cincinnati Flamatic surface hardening of the hub of a new automatic torque converter transmission will be shown in action—in actual production—at the Metal Show (Chicago International Amphitheatre, October 23-27). This exceptional job is one of the many presented in print, with complete data on hardness patterns, metallurgy, and production rates, in the brand new catalog on the Cincinnati No. 2 Flamatic Hardening Machine. See the Flamatic exhibit at the Show—and get your copy of the new catalog: Publication No. 1724.

flamatic

THE CINCINNATI MILLING MACHINE CO.

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CINCINNATI



THE FEDERAL VIEW

THIS WEEK IN WASHINGTON

Expanding Steel—In announcing proposed expansion that would raise steel industry capacity to 110,000,000 tons and blast furnace capacity to 73,400,000 tons or more, Commerce Secretary Sawyer put the lid on demands of government "planners" to regulate expansion. He lauded steel for "methodical planning". (THE IRON AGE, Oct. 5, 1950, p. 101.)

He pointed out that to take advantage of the expanded capacity it will also be necessary to broaden sources of iron ore, manganese, and alloying materials. He warned that "it takes men and materials taken from an economy working at virtual capacity and suffering shortages" to accomplish expansion.

The following table shows progressive steps of the planned expansion:

PLANNED STEEL CAPACITY EXPANSION (Sawyer Report)

STEEL		
	Annual Capacity	Planned Expansion
	(net tons)	
July 1, 1950	100,563,000	
December 31, 1950	103,032,000	2,469,000
December 31, 1951	107,004,000	3,972,000
December 31, 1952	109,963,000	2,959,000
Net Capacity Increase		9,400,000
BLAST FURNACE		
July 1, 1950	71,622,000	
December 31, 1950	71,749,000	126,000
December 31, 1951	72,833,000	1,084,000
December 31, 1952	73,378,000	545,000
Net Capacity Increase		1,734,000

The above figures contained in the Sawyer Steel Expansion report were based upon figures supplied by the American Iron & Steel Institute.

To Divert Steel—Three million tons of steel must be diverted from current production to construct the furnaces, rolling equipment, ovens and other equipment needed to construct 9.4 million tons of capacity. Sawyer might have added that production of an additional 9.4 million tons of steel would require the following additional amounts of raw materials: iron ore, 12,825,000 tons; coal, 10,500,000 tons; scrap,

4,250,000 tons; pig iron, 4,250,000 tons; limestone, 3,450,000 tons; manganese, 160,000 tons; chrome ore, 63,000 tons; and metallic nickel, 14,000 tons.

Bomb Defense Mapped—The new civil-defense agency soon to be created by President Truman will focus particular attention on plans for defending industry. "Federal Civil Defense Administration" is the label tentatively selected for the new agency.

Although the FCDA probably won't see the light of day for several weeks, the government has not been idle. W. Stuart Symington and his National Security Resources Board have been busily conferring with state and city officials over the basic questions of who'll do what when the bomb drops.

Washington takes the view that each locality must work out its own solutions to its own particular local problems. As one NSRB official puts it: "We can't plan for every locality on the same basis. State and city governments must impress on their industries the necessity for plant protection programs and the enormity of the task ahead."

Big Business Again—By means of a memorandum sent to most of the cabinet officers and to selected agency chieftains, the White House has dragged out and set up anew the New Deal bogey—"economic concentration." The president fears

that partial mobilization may again expose the economy of this threat and place the economic welfare in jeopardy. So, he instructs the departments, if any such evils are found or suspected in the course of defense preparations, they are to consult immediately with the Justice Dept. or the Federal Trade Commission or both. Not only have the Commission chairman and Attorney General been instructed to open their doors for such complaints, but they have been further instructed to report directly to the White House.

Coke Loss Foreseen—Something new is being added to the causes for worry concerning materials supply. Results of a recently completed study by the Bureau of Mines indicates that a possible 3 pct of existing coke capacity may be lost over the next 4 or 5 years as a result of extension of natural gas lines into new areas.

Operators of some 600 ovens which produce coke as a byproduct while manufacturing gas have said that in all probability most of these ovens would have to close down when natural gas reaches their area. They say it would be next to impossible to operate without their gas contracts: their aggregate capacity is about 2.6 million tons of coke. And while very little of this production goes to blast furnaces, its loss is a real problem to numerous scattered foundries and other industries dependent on it.



By EUGENE J. HARDY

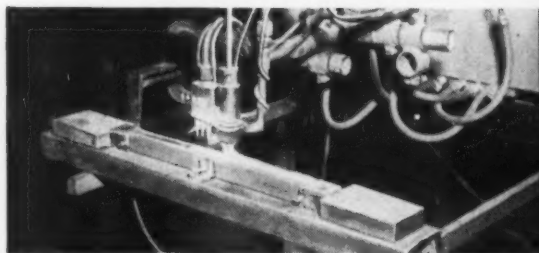
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for surfacing parts
faster, more economically

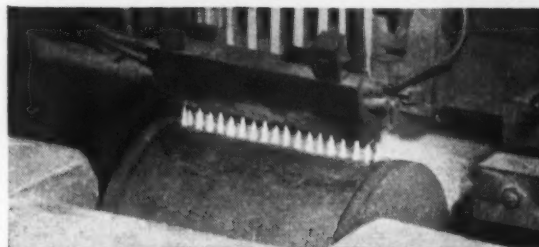
Advantages over Manual Methods

- Up to 4 times faster
- Smoother, more uniform deposits
- Less rod required per piece surfaced
- Finishing time reduced

Three Mechanized Hard-Facing Methods



1. **STRAIGHT LINE** — for relatively long, narrow surfaces like knives.



2. **CYLINDRICAL** — for parts such as pump rods, sleeves, and bushings.



3. **CIRCULAR** — for gate valves and other circular pieces.

Mechanized hard-facing is a new and economical process developed by Haynes Stellite Division for applying a protective surface to wearing parts on a production basis. With a mechanized setup, parts can be surfaced up to four times faster than by manual methods. In addition, less hard-facing material is required per piece surfaced. The deposits produced are smooth and uniform, and therefore require less finishing time.

For full information on mechanized hard-facing, write to Haynes Stellite Division, Kokomo, Indiana. If you want help in determining whether any job in your shop should be mechanized, ask to have a service engineer call.

The straight-line hard-facing machine will be demonstrated at the Metal Show in Chicago—Areas 901, 1001, and 1101. Come in and see it in action.

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L. W. Ball
SNT president

HIGH PRODUCTION Is Metal Congress Theme

THIS year's Metal Congress & Exposition, Chicago, Oct. 23-27, will stress high production. Now more than at any other time in history the emphasis belongs there. New methods, new equipment, new materials will be shown by many of the more than 350 exhibitors.

Well over 200 papers are included in the technical programs of the four sponsoring societies: American Society for Metals; American Welding Society; Institute of Metals Div., American Institute of Mining & Metallurgical Engineers; and the Society for Non-Destructive Testing.

A large area of the International Amphitheatre has been set aside for the ASM Metallographic Exhibit of micrograph studies of all types of metals and alloys. On Sunday, Oct. 22, a sales clinic on how to sell through industrial exhibits will be held at 8 p.m. at the Palmer House. C. T. Burg, general sales manager, Iron Fireman Mfg. Co. will head the discussion. On Thursday, Oct. 26, the ASM business forum will get under way at the Palmer House with producers and consumers of metals reporting on what's ahead in the metals industries.



Educational Lectures At the Palmer House

Educational lectures will be given on Oct. 23, 24 and 25 at the Palmer House. Subjects are: "High Temperature Properties of Metals;" "Interpretation of Tests and Correlation with Service;" and "Metallurgy of Titanium," respectively. Each subject will be treated in a series of lectures beginning at 4:15 and 8:00 p.m. each day.



TECHNICAL PROGRAM Of National Metal Congress

TECHNICAL programs of the four societies participating in the congress at Chicago are correlated here for ready day by day reference. The ASM will hold its sessions at the Palmer House; AWS at Hotel Sherman; AIME at the Sheraton; and the Society for Non-Destructive Testing at the Morrison. Two of the societies have scheduled banquets: ASM at the Palmer House on Thursday, Oct. 26; and AIME on Tuesday, Oct. 24, at the Sheraton.

Earl C. Smith, chief metallurgist, Republic Steel Corp. will deliver the Campbell Memorial Lecture on Wednesday at 9:30 a.m. Dr. R. C. McMaster will give the annual Mehl lecture that afternoon at 2. Both will be at the Palmer House.

Monday, Oct. 23

9:30 A.M.

ASM—SURFACE PHENOMENA

The Carbonitriding Process of Case Hardening Steel, by G. W. P. Rengstorff, M. B. Bever and C. F. Floe, Massachusetts Institute of Technology.

Effects of Various Alloying Elements in the Coating Bath on the Microstructure and Bend Performance of Hot-Dipped Aluminum Coatings on Steel, by D. O. Gittings, D. H. Rowland, and J. O. Mack, Carnegie-Illinois Steel Corp.

Formation of Oxides on Some Stainless Steels at High Temperatures, by H. M. McCullough, Sylvania Electric Products Co., M. G. Fontana and F. H. Beck, Ohio State University.

The Oxidation of Pure Iron, by J. K. Stanley and Miss J. von Hoene, Research Laboratories, and R. T. Huntoon, Carnegie Institute of Technology.

AWS—WELDABILITY

Some Observations on the influence of Low-Temperature Cooling Rates Following Welding on the Ductility of Arc

Welds in Mild Steel, by A. E. Flanigan, S. I. Bocarsky and G. B. McGuire, University of California.

The Effect of Nitrogen on Brittle Behavior of Mild Steel, by G. H. Enzian and G. J. Salvaggio, Jones & Laughlin Steel Corp.

The Micro-Mechanism of Tension Impact Fracture of Structural Steel—A Metallographic Study, by W. H. Bruckner, University of Illinois.

Influence of Biaxiality on Notch Brittleness, by D. Rosenthal, University of California, and W. D. Mitchell, Douglas Aircraft.

AWS—ARCS AND ELECTRODES

The Nickel-Molybdenum-Vanadium Alloy Steel Shielded Arc Welding Electrode, by W. H. Wooding, Philadelphia Naval Shipyard.

Aluminum-Magnesium Filler Metals for Welding High-Strength Aluminum Alloys, by R. D. Williams and D. C. Martin, Battelle Memorial Institute.

The Rotary Electrode for Manual Metallic Arc Welding, by Prof. Gilbert S. Schaller, University of Washington.

Advance Research Techniques for Study of Arcs in Inert Atmospheres, by Roger H. Gillette, Linde Air Products Co., and R. T. Breymeier, Union Carbide & Carbon Research Labs., Inc

AWS—SURFACING

Some Characteristics of Composite Tungsten Carbide Weld Deposits, by H. S. Avery, American Brake Shoe Co.

Hard Facing of Steam Valve Seats and Disks, by O. E. Swenson, U. S. Naval Engineering Experiment Station.

New Production Applications of Hard Facing, by Eldon C. Hurt, Union Carbide & Carbon Corp.

The Present Status of Composite Metal Fabrication for Arc Welding by H. E. Cable, Lincoln Electric Co.

AIME—PLASTIC DEFORMATION

An Experimental Survey of Deformation and Annealing Processes in Zinc, by D. C. Jillson.

Quantitative Stress-Strain Studies on Zinc Single Crystals in Tension, by D. C. Jillson.

A Study of the Plastic Behavior of High-Purity Aluminum Single Crystals at Various Temperatures, by F. D. Rosi, and C. H. Mathewson.

A Study of Strain Markings in Aluminum, by B. R. Banerjee.

Rolling Textures of Aluminum, by H. Hu and Paul Beck.

2:00 P.M.

ASM—PHYSICAL METALLURGY

Recovery and Cold Working of 52S Commercial Aluminum Alloy, by Gerard H. Boss, Oak Ridge National Lab.

A Metallurgical Investigation of Silver Chloride, by R. D. Moel-

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for Inert Gas Shielded Welding— ARGON or HELIUM?

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Helium offers higher heat, deeper penetration and faster speeds. Argon requires lower heat, produces less spatter and gives smoother operation. In special cases the gases can be mixed for optimum arc characteristics; these mixtures may run from 6 to 1 to 1 to 1.

FOR several years now, there has been considerable inconclusive debate in the welding industry over the question of which shielding gas is superior for inert-gas-shielded arc welding. The basis for the argument, on all sides, is unsound—for it is largely founded on misunderstanding of the real nature and function of the inert gases as they are being used in these important processes. Those who have been overzealous in their arguments for superiority of argon over helium, and for helium over argon, either do not know or do not clearly understand the situation. This brief article, based on the experience of well-versed specialists in these processes, seeks to present the facts, as fully as possible and as free from prejudice as they can be made.

An examination of the published facts about inert shielding gases shows that under all the persiflage of argument, the situation is—argon and helium are each better than the other, in the right conditions and for the right purpose.

Experience, particularly since the development of inert-gas-shielded metallic-arc, or Aircomatic welding, bears this out to a marked degree.

Characteristics of the Gases

The two gases share, to an absolute and therefore indistinguishable degree, the fundamental quality for this purpose. Both are completely inert, forming no compound with any other element. Thus, chemically, there is nothing to choose between them.

On the surface, their physical properties are apparently quite different in one important respect, argon has an atomic weight nearly ten times that of helium. As described by Conway,¹ this has led to a fiction that argon will hold a better blanket over the weld and arc, since it is heavier than air. The fictitious quality of this idea results from the fact that either gas, in the arc zone, is heated to such a temperature (over 5430°F) that it rises very rapidly and with little difference in the lifting rate between the two

gases. The temperature at which welding takes place, therefore, destroys the apparent effect of this physical difference.

The voltage per unit of arc length with helium is very much greater than it is with argon. Therefore, the arc is hotter, penetration with helium will be more effective and deeper, travel speeds can be appreciably faster, and in many cases, adverse heat effects upon the work can be minimized. At the same time, particularly in metal-arc welding, the helium arc is harsher, more inclined to spatter, somewhat less comfortable in its operation. The argon arc, by comparison, is quite smooth and soft and slower, with shallowed penetration.

It is these differences in the electrical effects

of the two gases that bring us to the crux of the question. Obviously, neither gas is going to provide a universally perfect set of conditions for all welding. The answer to the entire dispute is to select the shielding gas to fit the job.

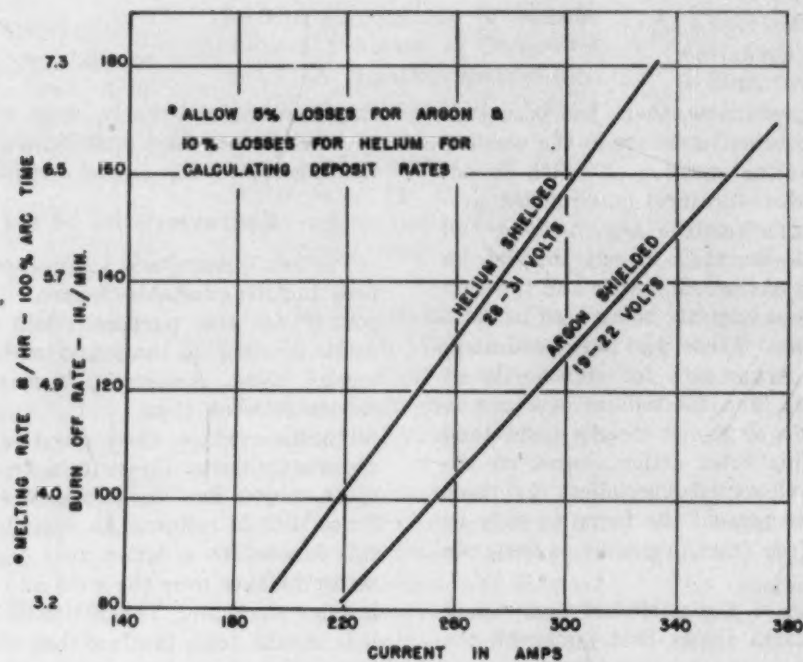
A dispassionate view of the relative usefulness of the two gases makes it clear that each is a valuable adjunct to the basic processes. Availability of these different characteristics increases the suitability of the processes for a wider range of work. We can do jobs with helium which are not satisfactory, or perhaps only not quite so satisfactory, with argon, and vice versa. One of the most common successes in trouble-shooting on inert-gas-shielded arc-welding installations has been the switch from one shielding gas to the other. Such shifts are about as likely to be from helium to argon as from argon to helium. Unreasoned favoritism of both salesmen and customers for one gas or the other, is a major cause of such unsatisfactory original gas choices, and failures of inert-gas-shielded arc-welding resulting from such errors have been all too common.

A tabulation of the characteristics of the two gases may show more clearly than a verbal discussion the essential differences. The table and the accompanying curves demonstrate the functional difference—which is essentially that of higher heat, deeper penetration and faster speeds for helium. Somewhat shallower penetration, lower heat, and slower speeds characterize argon.

We must not, of course, overlook the difference in operating character of the two gases, for the arc in argon is generally smoother. This last point can be decisive when conditions permit a

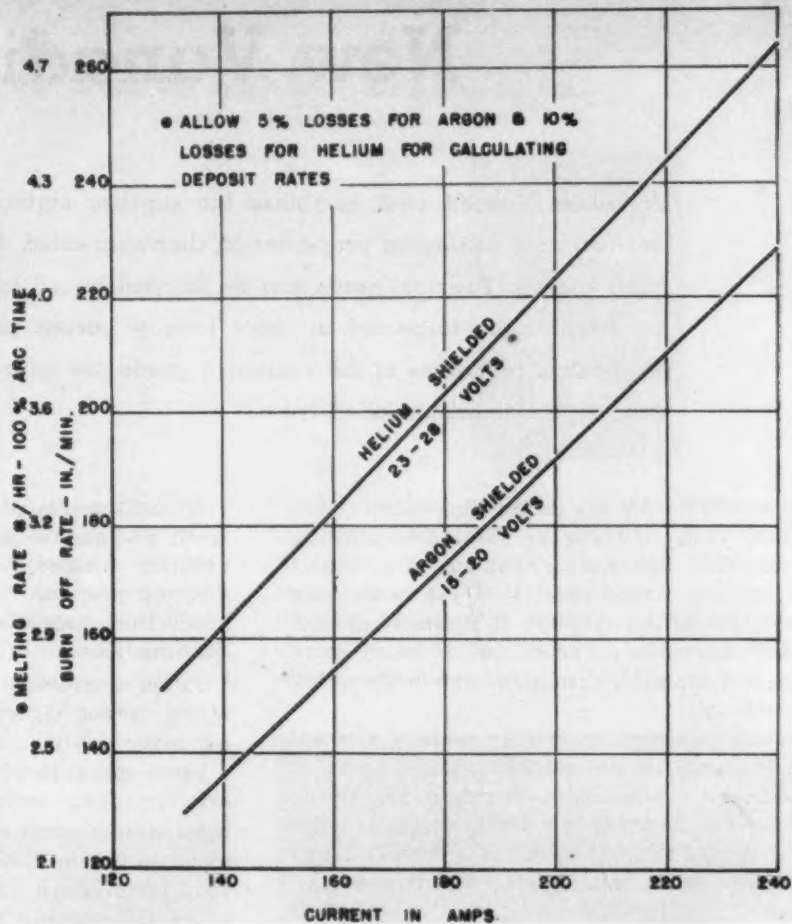
CHARACTERISTICS OF THE GASES

Characteristic	Argon	Helium
Chemical Activity	Inert (Monatomic)	Inert (Monatomic)
Atomic Weight	39.86	4.0
Purity, pct	99.9	99.99
Welding Currents Used with:	ac dc Reversed Polarity dc Straight Polarity	dc Straight Polarity dc Reversed Polarity ac
Ratio, Arc Voltage	1.0	1.4



Average welding rates for 3/32 in. diam 25 wire

Average welding rates for 1/16 in. diam 25 or 435 wire. The difference in the two gases is essentially that of heat, penetration and welding speed. Helium gives higher heat, deeper penetration and faster welding speed than does argon.



more or less even choice, but generally the nature of the work will determine the type of welding required, and so determine to a great extent the shielding gas best suited to the job. Heavy work, requiring much weld metal; work with high heat conductivity; work where maximum speed and penetration are required are better accomplished with helium. Thin material where burn-through would be likely; appearance work, where smoothness and minimum spatter are essential; other jobs where lower heat and smoother operation pay are done better with argon.

Gases Can Be Mixed

What happens when the job crosses two such categories? Where helium is too hot, argon too cool, for instance? The answer is to mix the gases. By proportioning the two, any desired combination or balance of the characteristics can be had. While this practice has had little importance in tungsten-arc operations, it has been valuable in working with the inert-gas-shielded metal-arc (consumable electrode) process, where speed and penetration are a more complex function than with the nonconsuming electrode.

Proportioning of the two gases is not critical, and it is seldom necessary to do more than adjust

proportionate flows by means of separate flowmeters, and feed the two gases through a "Y" connection to the shielding gas line to the work. The proportions generally used range from as high as 6 to 1 to almost an even 1 to 1 ratio, and stepless variation is possible all the way from bleeding in a little of one gas to the half and half mixture. Total shielding gas flows remain just about the same as would be required with either gas alone.

By this means, there is no limit to the range of characteristics available in the inert-gas-shield, and no sound reason for a universal preference for either argon or helium. The entire gas selection problem, if it is to be intelligently handled, consists of a thorough analysis of the arc characteristics required for the job at hand (based, of course, on impartial understanding of the characteristics of the gases) and selection of the gas, or mixture, that will do that job best. While this may often require some experiment and trial and error work, to arrive at the exact balance of procedures for the job, the starting point will then be at least logical and likely to lead to a successful choice.

Reference

¹ M. J. Conway, "Application for Helium in Inert Arc-welding," *Welding Journal*, July 1950.

New Vanadium Steel

Vanadium rimmed steel combines the superior surface of rimmed steel with the non-aging properties of aluminum-killed deep drawing quality steels. The new grade can be shipped in coil form and does not have to be inspected in sheet form to insure prime surface. Mechanical properties of the vanadium grade are as good or better than the old aluminum-killed type.

PRESENT-DAY low carbon sheet steel comes very close to being an ideal deep-drawing material. Far cheaper than any other metallic sheet, low carbon sheet steel yet ranks near the very top in drawability. It is almost as ductile and drawable as brass and is much more ductile and drawable than aluminum or the alloys of aluminum.

Ordinarily, drawing sheet is made of rimmed steel. Because of its composition and mode of solidification rimmed steel, therefore, has a very good surface, and this is a highly desirable quality. Ordinary rimmed steel has a serious drawback, however, in being subject to aging during storage.

To obviate aging aluminum-killed steel came into use for deep-drawing sheet about 15 years ago. This steel is killed by adding to the molten steel about 4 or 5 lb of aluminum per ton of steel. Sheet made of such aluminum-killed steel is non-aging. Properly skin-rolled sheet of this sort will not show stretcher strains in drawing even after the longest storage periods, nor will there be an increase in hardness.

The non-aging aluminum-killed steel has excellent deep-drawing properties. Despite the large addition of aluminum, the interior of sheet made from such steel is surprisingly free from aluminum-oxide inclusions. The surface of aluminum-killed steel sheet, however, is not as good as that of rimmed steel.

Because of this serious disadvantage of killed steel, a way was sought of making a rimmed non-aging steel. It was discovered that by the use of substances which combine readily with nitrogen but which do not act as strong deoxidizers, steels can be rendered non-aging without killing.

Vanadium was found to be such an element. Vanadium proved to be a very weak deoxidizer, not much stronger than manganese, but it has a very high affinity for nitrogen. Thus the addition of about 0.05 pct V, or about 1 lb of vanadium per ton of steel, to rimmed steel does not deoxidize the steel enough to affect the rimming action. Yet sheet made from such vanadium-treated rimming steel is completely non-aging.

Vanadium-treated non-aging steel rims perfectly and has the good surface characteristic of ordinary rimmed steel. It has very good deep-drawing properties and is being tried out on a production scale for a wide variety of deep-drawing jobs.

In an improperly rimmed ingot, the boiling action is not vigorous enough and the carbon monoxide gas is not properly released, causing a great many blowholes to form very near the skin toward the bottom of the ingot. These blowholes occupy great enough volume to more than make up for the shrinkage from the liquid to the solid state. Such an ingot may be seen to rise above the pouring height during solidification. The blowholes in such an ingot are more easily torn during heating and rolling so that poor surface may result. The production of properly rimmed ingots requires the most delicate control of the refining, deoxidation and temperature of the steel.

Aluminum Causes Poor Surface

In the case of aluminum-killed steel, enough aluminum has been added to combine with and fix the oxygen in the steel so that the steel is deoxidized or killed. Such steel lies quietly in the mold without boiling and solidifies solid without blowholes. To ensure completely non-aging characteristics in aluminum-killed sheet steel an excess of aluminum must be used and this causes the steel to pipe deeply. Nevertheless, after proper top discard sheet made of this steel shows surprisingly little lamination even in the upper portion of the ingot, and, considering the large aluminum addition, surprisingly few aluminum-oxide inclusions. However, despite the absence of blowholes near the outer surface of the killed ingot, the aluminum in the steel forms surface films of aluminum oxide during pouring; some of this oxide becomes encrusted at the surface of the ingot where the molten steel is chilled by the mold. This is probably the main cause of poor surface in aluminum-killed steel.

for Deep Drawing Sheets



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By

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In a tensile test of as-annealed sheet steel, the stress-strain curve shows a yield point, as indicated in Fig. 1. During the formation of the yield point a group of jagged lines appears on the surface of the tensile specimen. These lines are known as luders lines. After the steel is skin rolled to only about 1 pct elongation or even less a yield point no longer appears in the stress-strain curve, and likewise no luders lines appear on the test piece.

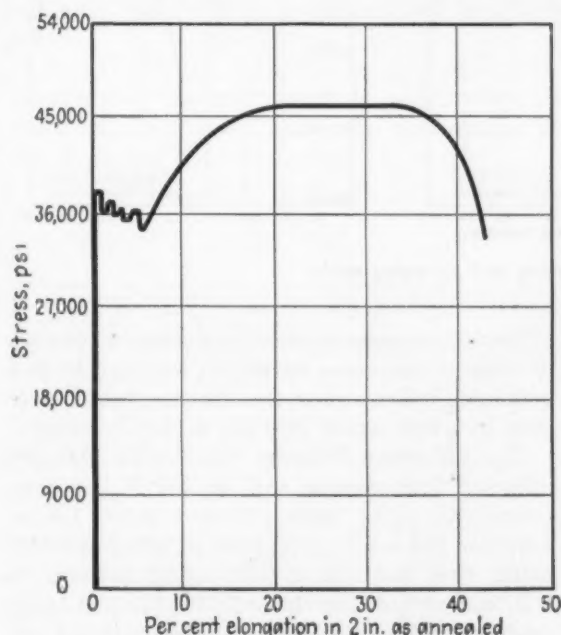
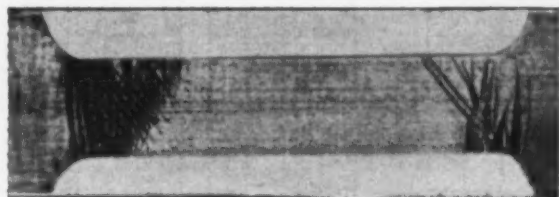


FIG. 1—Stress-strain curve of annealed sheet steel showing irregular deformation at yield point. Above is a photo of the tensile test piece in which the stretcher strains or Luders lines are visible.

The stretcher strains which sometimes appear in drawn steel parts, Fig. 2, have been found to be exactly analogous to the luders lines which appear in a tensile sample with a yield point. Skin-rolling step is included in making sheet steel in order to prevent the formation of stretcher strains shown in Fig. 2.



FIG. 2—Stretcher-strain marks on a fender stamping made from a sheet that had not been skin-rolled.

After ordinary rimmed steel is skin passed to eliminate the yield point, the steel will stay in this condition for but a short time of only a few weeks. After that, as a result of aging, the yield point returns. In non-aging steel, however, the yield point does not return.

One of the most convenient and accurate ways of distinguishing between aging and non-aging steel is to determine the tensile strength at room temperature and at the blue heat temperature of about 400°F. Aging steel has a considerably higher tensile strength at 400°F than at room temperature, whereas non-aging steel has a considerably lower tensile strength at 400°F than at room temperature.

The differences between aging and non-aging steels as manifested by tests at 400°F are shown in the upper half of Fig. 3. The ordinary rimmed steel being an aging steel shows a much higher tensile strength at 400°F, whereas the aluminum-killed steel and the vanadium-treated steel show a much lower tensile strength at 400°F. The

vanadium-treated steel behaved exactly like the aluminum-killed steel.

The tensile test results in the lower half of Fig. 3, having all been made at room temperature, manifest the aging phenomenon not by the increase in tensile strength at 400°F, but by the return of the yield point after skin rolling and aging at 212°F. The ordinary rimmed aging steel which has a higher tensile strength at 400°F shows a return of the yield point upon accelerated aging at 212°F after skin rolling. The non-aging steels with a lower tensile strength at 400°F do not show a return of the yield point upon accelerated aging at 212°F after skin rolling.

and non-aging steel tested at room temperature and at 400°F show practically no difference between the ordinary rimmed steel aging sample and the two non-aging samples. All three samples show about the same ductility. In the samples tested at 400°F, however, the two ordinary rimmed steel aging samples looked quite different from the two non-aging samples. The aging samples show the sharp luders lines. It is evident from the appearance of these samples tested at 400°F that the sharp luders lines have markedly lowered the ductility.

This point is important because in actual deep-drawing operations the stamping may get quite hot and reach a temperature near 400°F. Since steels which show the same ductility at room temperature may show quite different ductilities

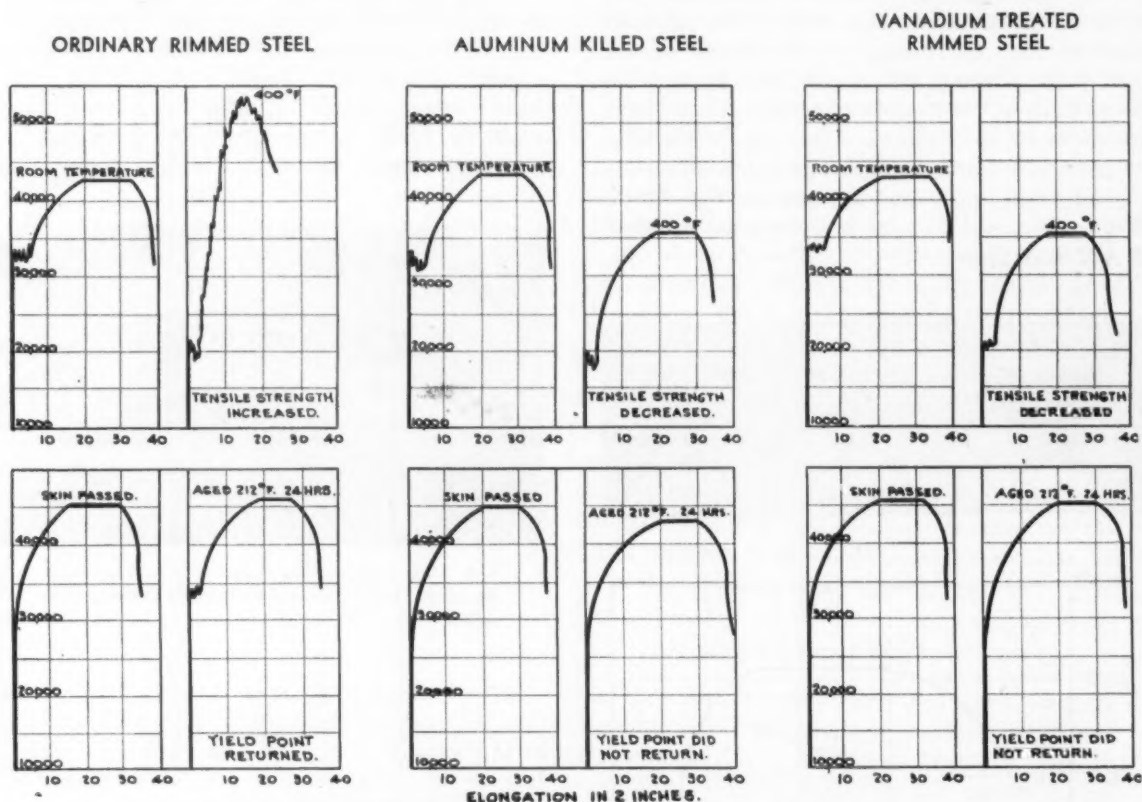


FIG. 3—Stress-strain curves of aging and non-aging steels.

In the upper lefthand corner of Fig. 3 the stress-strain curve of the ordinary rimming aging steel tested at 400°F shows sharp serrations and rather low ductility. This type of stress-strain curve is characteristic of strongly aging steel. It probably results from the almost instantaneous age-hardening at the 400°F testing temperature as soon as incipient yielding takes place. The serrations probably represent incipient yieldings stopped by rapid age-hardening so that further yielding only occurs under higher loading. The serrations are accompanied by the formation of sharp luders lines which may cause localized necking and fracture.

The appearance of tensile samples of aging

at 400°F, it seems evident that tests made only at room temperature cannot be expected to give a reliable indication of the drawing behavior of steel in a part which gets hot during drawing.

The difference between the tensile strength at room temperature and at 400°F has been termed the aging index. Table 1 shows typical hardness and tensile properties of aging and non-aging steel and also typical aging indexes. It will be observed that the ordinary rimmed aging steel has a plus aging index (+8000 psi) indicating the tensile strength at 400°F is 8000 psi higher than at room temperature. The non-aging steels each have a minus aging index (—7000 psi) indicating the tensile strength is 7000 psi

TABLE I

TYPICAL PROPERTIES

	Ordinary Rimmed Sheet	Aluminum- Killed Sheet	Vanadium- Treated Rimmed Sheet
Rockwell B Hardness.....	40	40	39
Yield Strength, psi.....	26,000	24,200	24,000
Tensile Strength, psi.....	43,300	44,600	43,300
Elongation in 2 in., pct.....	41	42	42
Aging Index, psi.....	+8,000	-7,000	-7,000

lower than at room temperature. A minus aging index as large as -7000 psi indicates fully non-aging steel. The vanadium-treated rimmed steel had this large minus aging index as well as the fully aluminum-killed steel. The Rockwell B hardnesses and the elongations in the tensile test of the vanadium-treated steel are likewise the same as in the fully aluminum-killed steel.

The high cost of vanadium makes it necessary to utilize the product of the whole ingot of vanadium-treated steel for deep-drawing purposes, including the top cuts.

Table II shows representative average analyses from 20 heats of vanadium-treated steel. The full slab yield from the ingot was 85 pct, the top crop being 9 pct, the bottom crop 4 pct and the scaling loss 2 pct. These ingots were divided into three equal cuts, a top, a middle and a bottom cut. The samples for analysis were taken from the finished sheets, from the top and from the bottom cuts from midway position in the sheet, between the edge and center. The sheet to represent each cut was selected at random.

There was no significant difference in the average analyses in carbon manganese and vanadium between the top and bottom cuts. The average analyses for sulfur from the top cuts were somewhat higher than the average analyses from the bottom cuts. However, the sulfur contents in the top cuts were not unduly high.

Table III gives data on the properties and per-

TABLE II

TOP VS. BOTTOM CUTS

	Top Cuts, pct	Bottom Cuts, pct
Carbon.....	0.06	0.06
Manganese.....	0.27	0.27
Sulfur.....	0.029	0.025
Vanadium.....	0.034	0.035

Average analyses from midway between edge and center of sheet from .60 top and bottom cuts of 50 ingots from 20 heats of vanadium-treated steel.

formance of sheet from top cuts and bottom cuts of a heat of vanadium-treated steel. This was a 135-ton heat and the sheet product of the whole heat, including the entire product of the top cuts, was used for drawing a very difficult front fender. In this heat each ingot was divided into only two cuts, a top cut and a bottom cut.

There was very little difference between the composition and properties of the top and bottom cuts. The amount of breakage was somewhat higher on the top cuts than on the bottom cuts, but considering the severity of the job the performance of the top cuts was very satisfactory.

Although the vanadium-treated steel has excellent deep drawing properties and has performed well on very severe jobs, it has seemed preferable not to risk using the top cuts of vanadium steel on the toughest jobs. Thus the bulk of the vanadium steel manufactured has been applied on deep-drawing jobs of medium severity in which it had formerly been found necessary to apply aluminum-killed steel.

Over 100,000 tons of vanadium-treated steel have been made. Every heat of this steel rimmed perfectly, without a single exception, and hence has given the good surface characteristic of rimming steel. The excellent performance of this large tonnage of vanadium steel both in regard to low breakage and freedom from stretcher strains indicates that this steel is well adapted for these jobs.

Strip rolled in continuous mills is first hot

TABLE III

COMPOSITION, PROPERTIES, AND PERFORMANCE OF VANADIUM STEEL.

Composition		Top Cuts					Bottom Cuts				
		C	Mn	S	P	V	C	Mn	S	P	V
		0.06	0.29	0.030	0.006	0.044	0.04	0.26	0.028	0.006	0.037
Properties	Rockwell B Hardness.....	37					35				
	Yield Strength, psi.....	27,850					27,650				
	Tensile Strength, psi.....	44,600					43,550				
	Elongation in 2 in., pct.....	42					43.5				
	Aging Index, psi.....	-5800					-7700				
Performance	Per cent breakage in one of the most difficult front fender stampings.....	3.4					1.7				

Average analyses, hardness, tensile and aging properties, and performance of 0.045 in. gage sheet from the top and bottom cuts of an entire heat of vanadium-treated steel.

rolled to a hot band, the strip now being about twice as thick as the finally desired gage. This hot band is then cold rolled to approximately the finished gage. The hard cold-rolled strip is then bright annealed to soften it. The annealing temperature is well below the critical temperature of the low carbon steel but high enough to recrystallize the severely cold-rolled steel. The very soft and ductile annealed steel is given a final skin rolling. The cold reduction in this operation is very small, about 1 pct or less. This is not enough to harden the steel appreciably but it serves to obviate stretcher straining.

Fig. 4 illustrates the microstructure of the hot-rolled and of the cold-rolled strip steel. The hot band has a fairly fine-grained structure, this being dependent to some extent on the finishing temperature of the strip in the hot mill and on the coiling temperature. There is usually very little difference between the microstructure in the hot band of ordinary rimmed strip steel and of aluminum-killed strip steel. The hard cold-rolled strip shows the distorted and elongated structure of severely cold-worked steel. The hard cold-rolled steel has a tensile strength of about 100,000 psi and has very low ductility.

Fig. 5 shows as annealed structures of rimmed steel sheet. The first micrograph at the left still shows vestiges of the cold-reduced structure indicating the sheet was underannealed. The Rb 55 hardness shows it is too hard for deep-drawing steel. The next micrograph has a good sized uniform grain indicating complete recrystallization of the cold-rolled structure during annealing. This desired structure, the Rb 39, and the elongation in 2 in. of 42 pct, indicated this steel has good drawing quality. The next micrograph has too coarse a grain indicating overannealing either at too high a temperature or for too long a time. Such excessively coarse grain causes poor surface and usually poor drawability.

Fig. 6 shows the microstructure of properly annealed ordinary rimmed steel, vanadium-treated steel and aluminum-killed steel. The ordinary rimmed steel and the vanadium-treated rimmed steel have a very similar equiaxed grain, but the

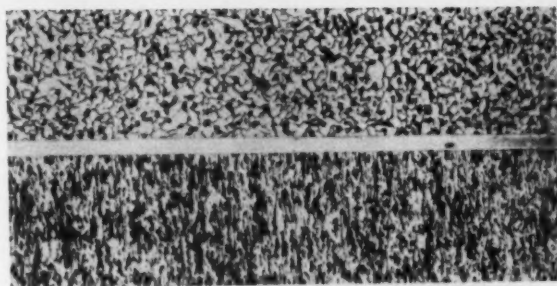


FIG. 4—Microstructure of hot rolled sheet shown at top has a yield strength of 39,000 psi, T. S., 54,000 psi, elong. in 2 in., 35 pct and Rb of 62. The cold reduced structure, bottom photo, has been reduced 50 pct. Comparable properties are yield strength, 96,000 psi, T.S., 96,000 psi, elong. in 2 in., 1 pct and Rb 93. Mircos are 100X.

aluminum-killed steel has an elongated grain. An elongated grain is characteristic of properly made aluminum-killed steel.

In all of these types of steel a smaller amount of cold reduction from the hot band to the hard cold-rolled strip tends to produce a somewhat coarser and more desirable as-annealed grain. However, in rimmed steel of both the ordinary and the vanadium-treated type, it is quite possible to obtain a satisfactory grain size with even a fairly heavy cold reduction of as much as 60 pct. With aluminum-killed steel, on the other hand, the amount of cold reduction must be held under 50 pct to get the desired fairly coarse elongated grain with the optimum deep-drawing properties. This means that the hot band must be hot rolled to a thinner gage which becomes quite a drawback with the thinner gage strip, especially in great widths.

To obtain the desired structure shown in Fig. 6 in ordinary rimmed steel it is advisable to cool the hot band rapidly with water sprays as it emerges from the finishing stand and thus to coil it cold, or under about 1200°F. Otherwise too coarse an annealed structure may result.

To obtain the elongated grain in aluminum-killed steel which is necessary for the best deep-drawing properties, the hot band of this steel is also cooled rapidly with water sprays as it emerges from the finishing stand and it is coiled cold, preferably under 1100°F.

With the vanadium-treated steel it has been discovered that to get as soft a steel as possible the hot band should be finished at a high tem-

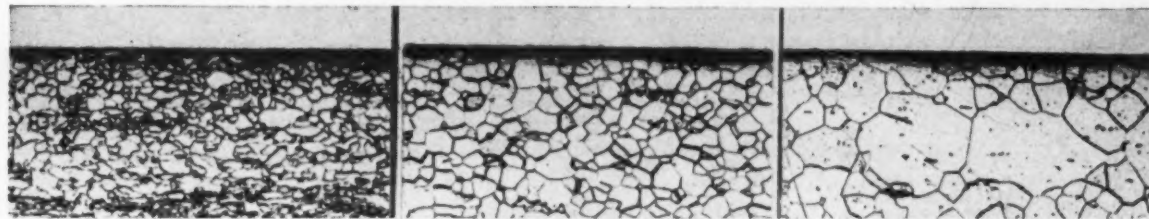


FIG. 5—Effects of annealing on microstructures of rimmed steel are shown above. Mag. 100X.

Under-Annealed		Good Structure		Too Coarse	
Y.S.	35,000 psi	27,000 psi		24,000 psi	
T.S.	51,000 psi	43,000 psi		40,000 psi	
Elongation	38 pct	42 pct		42 pct	
Rb	55	39		32	

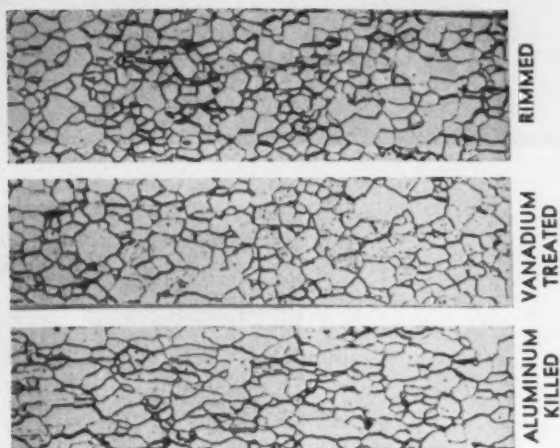


FIG. 6—As annealed structures of three types of deep drawing steels. Mag. 100X.

perature, over 1600°F, and then coiled hot (at about 1400°F) without cooling with water sprays along the run-out table.

Fig. 7 illustrates the effect on the as-annealed grain size of coiling the vanadium-treated steel cold and of coiling it hot. After cold coiling the as-annealed structure shows fine grain near the surface. After hot coiling the as-annealed grain structure at and near the surface comes out coarser and the steel is consequently softer.

In bright annealing large batches of steel weighing about 100 tons in either sheet or coil form are charged into controlled atmosphere furnaces. With rimmed steel in sheet form, the annealing temperature is generally about 1250°F, the time at temperature being about 30 hr; it generally takes a somewhat longer time to reach this temperature. To get the desired large grain in aluminum-killed steel sheet, a somewhat higher temperature of about 1300°F is used. Vanadium-treated rimmed steel sheet is also annealed at a somewhat higher temperature than ordinary rimmed steel. For the best non-aging properties the annealing temperature should be maintained on the low side and the cooling rate should be very slow. For large charges the cooling time may be as long as 72 hr.

There has been an increase in the demand by sheet steel consumers for steel in coil form in re-

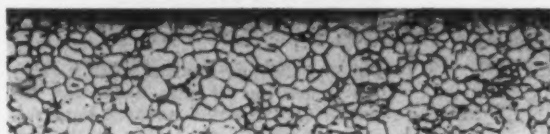
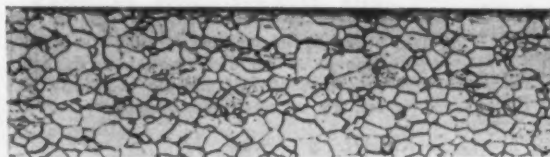


FIG. 7—The effect of hot coiling on the as-annealed structure of V-treated steel is shown here. The top photo shows the fine grains at the surface resulting from coiling cold. Coiling hot produces large grains shown at the top of the lower photo. Mag. 100X.



cent years. Many customers want their drawing steel delivered in coils because these can be blanked with less handling than separate sheets and because with coils the blanks can be spaced and fitted in with less scrap loss.

The inherently poor surface of aluminum-killed steel becomes a greater drawback when the steel is to be delivered in coil form. When the steel is processed in the form of sheets, individual defective sheets can be rejected during inspection, and the rest of the prime material can be shipped. In coil form, however, a defective portion of the coil cannot be rejected and the rest of the coil shipped—a whole coil must be either rejected or shipped. Since many coils of aluminum-killed steel contain some steel with poor surface, it is impossible to reject all such coils.

In general fairly large as-annealed grain is desired to get a soft deep-drawing sheet. It is of interest to point out, however, that hardness is not in itself a dependable criterion of drawability.

Likewise the hardness of skin-rolled sheet is not a dependable criterion of drawability. Skin rolling has a much greater effect in decreasing than in increasing the hardness. Therefore, a sheet of a given hardness, say RB 45 which has been skin rolled only 1 pct would be expected to give a much better drawability than another sheet of the same hardness which has been skin rolled 3 pct.

TABLE IV
EFFECT OF SKIN PASSING

		Hardness Rockwell "B"	Total Elongation in 2 in.	Uniform Elongation
Ordinary Rimmed Sheet	As Annealed.....	41	45	33
	Skin Rolled ½ pct....	43	43	27
	Skin Rolled 1 pct....	47	40	22
	Skin Rolled 2 pct....	50	40	20
Aluminum Killed Sheet	As Annealed.....	40	43	33
	Skin Rolled ½ pct....	40	44	29
	Skin Rolled 1 pct....	43	44	27
	Skin Rolled 2 pct....	46	43	25
Vanadium Treated Sheet	As Annealed.....	42	44	32
	Skin Rolled ½ pct....	42	44	29
	Skin Rolled 1 pct....	43	43	27
	Skin Rolled 2 pct....	46	42	25

In Table IV it will be observed that the effect of skin rolling in increasing the hardness and decreasing the elongation is greater in the aging steel than in the non-aging steel. In all of the three steels in Table IV, the effect of skin rolling in increasing the hardness and decreasing the total elongation is less than in decreasing the uniform elongation. This indicates that skin rolling has a larger effect in decreasing the drawability than in increasing the hardness. Thus for the aluminum-killed steel in Table IV, the RB hardness after 2 pct skin rolling is 46 and the uniform elongation is 25 pct. A sheet of the same steel with a RB hardness of 46 after ½ pct skin rolling would have a uniform elongation of close to 30 pct and would have much better drawability.

METALLURGIST'S NOTEBOOK



JOB

Hardening.

PROBLEM

Old-style electric hardening furnace required heavy element maintenance. Input dropped from 75 kw to 64 kw, resulting in reduced capacity. Complete rebuilding at cost of \$1500.00 would still entail about \$65.00 per month maintenance.

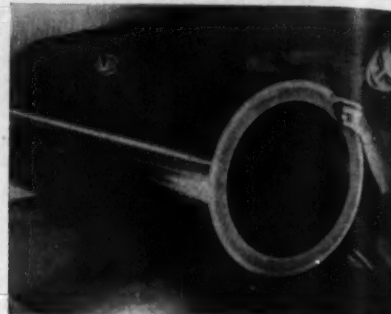
SOLUTION

Furnace was redesigned for Radiation system of heat transfer and converted to gas firing.

RESULTS

Eliminated \$1000.00 a year element maintenance. Saved \$505.00 per year by using gas instead of electricity (50 weeks, 5 heats per day at 1600°F). Production increase averaged 33 pct under these conditions, maintenance costs in over a year have been negligible.

Data courtesy of Standard American Engineering Co., Lyons, Ill.



JOB

Making machinery for the textile industry, including squeezer and padder rolls with a corrosion-resistant surface.

PROBLEM

Size and wall thickness made the cost of stainless steel prohibitive. Job was formerly resolved by covering an iron roll with a sheet of stainless steel, welded together. This was costly and not always satisfactory.

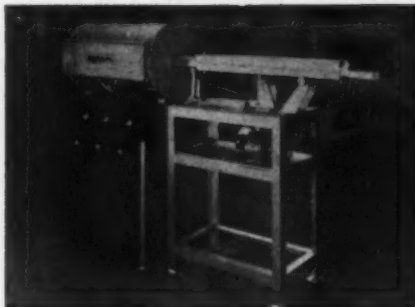
SOLUTION

The stainless steel was put on the gray iron by casting the two dissimilar metals centrifugally to form two concentric metallurgically bonded components.

RESULTS

Greater economy in production and a more satisfactory product. Less special attention required for each roll because of uniform quality giving better service.

Data courtesy U. S. Pipe & Foundry Co., Burlington, N. J.



JOB

Harden small business machine parts (spring clips).

PROBLEM

Parts had to be bright after hardening. Rejects had to be kept down to reduce costs in this competitive field. Identical heat treatment of each part was essential. No heat treating equipment had been able to do the job economically or satisfactorily.

SOLUTION

A Hevi Duty Shaker Hearth furnace was specifically designed for bright hardening, bright carburizing, bright dry cyaniding, and similar heat treating operations. The work was not pushed or mechanically handled in any way to distort it. This cut rejects substantially. Since each part was in the heating chamber the same length of time each received identical heat treatment.

RESULTS

Bottlenecks resulting from batch type heat treating methods were eliminated. With a few simple adjustments, the furnace was adapted to handling a wide variety of parts and performing many other heat treating operations.

Data courtesy Hevi Duty Electric Co., Milwaukee

JOB

Heating and quenching of stainless steels.

PROBLEM

Maintain size and finish so as to eliminate pickling, grinding and polishing.

SOLUTION

Use of hydrogen atmosphere during heating prevents any oxidation of surface and eliminates need of pickling. Use of water cooled refert in air quenching allowed full hardening without distortion. Maintained size relieved necessity of grinding in many instances.

RESULTS

Elimination of pickling and grinding on certain items, increasing production as much as 30 to 40 pct.

Data courtesy Lindberg Steel Treating Co., Chicago

JOB

To polish samples of strip steel for metallurgical examination.

PROBLEM

For the desired control over a rolling operation, it was necessary to polish and examine several hundred samples daily. Polishing with fine abrasives on a rotating lap would be expensive and require trained operators not available.

SOLUTION

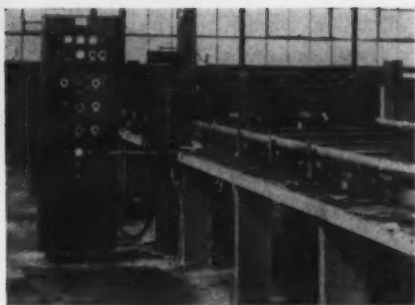
Prepare samples by electropolishing with Buehler-Walsman Electro-Polisher. A sandwich-type sample is made up of up to twelve 1/8-in.-thick sheets. A strip is polished across the face of this sample in about 30 sec by an unskilled operator.

RESULTS

Ten or more samples are prepared electrolytically in the time previously required for one sample.

Data courtesy Adolph J. Buehler Co., Chicago

Short case histories that tell the practical man how others have solved tough problems in metallurgy, heat treating and process control.



JOB

Checking hardness uniformity in alloy bars.

PROBLEM

To find a quick and inexpensive way to check hardness from end to end instead of spot checking the bars with a Brinell hardness machine.

SOLUTION

Installation of Magnetic Analysis equipment.

RESULTS

Considerable savings in time, labor and costs, as well as giving a complete hardness check for the full length of the bars. Inspection speed is 100 fpm.

Data courtesy of Magnetic Analysis Corp., New York



JOB

Machine small parts to very close tolerances of weight.

PROBLEM

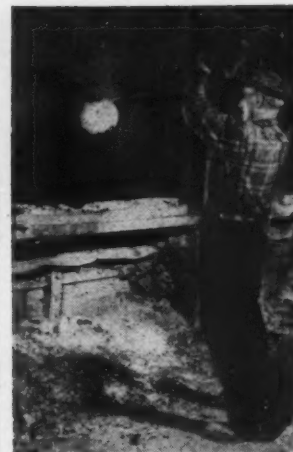
High rejects using ordinary micrometer methods. Ordinary apparatus for weighing slow, and subject to human error.

SOLUTION

Use of Gram-atic Balance. Two-man team, using chart for converting the necessary reduction of an intentionally overweight part to thousandths of an inch. Lathe operator then removed the metal necessary to bring within the necessary tolerances.

RESULTS

A 30 pct increase in speed, and reduction of number of rejects.
Data courtesy Fisher Scientific Co., Pittsburgh, and Sperry Gyroscope Co.



JOB

Measurement of bath temperature in an open hearth or electric melting furnace.

PROBLEM

Extreme temperatures involved ruled out use of ordinary thermocouples; presence of slag on top of the bath ruled out surface readings with radiation or optical pyrometers.

SOLUTION

Two methods were devised. The first involved use of a photovoltaic cell mounted at the rear of an air-purged sighting tube. Output of this cell is a function of the temperature and is received and converted to a temperature indication and record in an Electronik potentiometer. Immersion end of tube projects through slag into molten steel when taking reading. Second method makes use of an immersion thermocouple designed to withstand the heat for a sufficiently long time to provide an accurate reading. A steel tube contains a platinum thermocouple. A replaceable fused silica protecting tube protects the thermocouple well and transmits the heat from steel to thermocouple. Refractory material protects the immersion end and Electronik potentiometer indicates and records bath temperature.

RESULTS

Pounds of skulls per heat were reduced from 743 to 350 lb. Ladle life was increased 50 pct—from 13 to 18 heats per lining, as compared with 6 to 7 heats per lining previously. Number of heats with skulls reduced from 4 to 1.9 pct. Number of heats with large skulls reduced from 5.4 to 1.9 pct. Stool stickers were reduced 75 pct.

Data courtesy of Minneapolis-Honeywell Regulator Co., Brown Industrial Div., Philadelphia

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Metalworking Research



BATTELLE MEMORIAL INSTITUTE

—First of a Series—



By S. L. CASE, Technical Director.



and

H. E. JOHNSON, Asst. Supervisor,
Battelle Memorial Institute,
Columbus, Ohio

FULL BLOWN RESEARCH—
This specially designed 1/2-ton vessel was used to develop a new steelmaking process.

SINCE World War I, industry has become increasingly research conscious. This new awareness of the value of research was reflected in the action of Gordon Battelle, the founder of Battelle Memorial Institute, a non-profit corporation. This Ohio industrialist had a profound respect for the application of science as a means for solving industrial problems. He also understood the inadequacy of the then existing research facilities.

At the time Battelle Memorial Institute was founded, the United States had about 300 research laboratories with a total staff of 6000 persons. Today there are more than 2600 laboratories, employing about 130,000 researchers. The growth of Battelle Memorial Institute has paralleled the general expansion of industrial research in the United States. In 1929, when the first building was ready for use, the staff of the Institute consisted of 20 scientists and assistants, under the directorship of the late Dr. Horace W. Gillett. At the present time, the Institute employs about 1300. Of this number, research engineers and supervisory staff form the largest group—about 500 persons. The balance is composed of roughly 400 laboratory technicians and about an equal number of service personnel such as stenographic, photographic, maintenance, etc.

At the present time, the total cost of Battelle research equipment and the buildings housing

them exceeds \$5 million. Much of this equipment was designed and built to deal with specific problems of metalworking. Generally, in the metallurgical field, Battelle is able to do work on every phase of the making, shaping, processing and treating of steel and other metals, starting with the ore as raw material.

Project Size Varies Widely

In round numbers, the annual dollar volume of research work sponsored at Battelle by metalworking and metalproducing industries for each of the past 5 years averaged approximately \$1,660,000. This is about a third of the total research budget of the Institute, including government projects and work sponsored by private industry outside of the metallurgical field.

The number of industrial research projects sponsored annually at Battelle during the past 5 years averaged slightly more than 250. Research is sponsored either by individual industrial concerns, or by groups formed to finance research on a cooperative basis. During the past 5 years, the annual expenditures of individual concerns on research sponsored at Battelle ranged from a high of \$97,000 to a low of only \$615. On group-sponsored projects during the same period, the annual expenditures ranged from \$296,000 to \$27,000, and some of these projects have been going on uninterruptedly for over 10 years.

Reaches All-Time High

This is the first of a series of articles about nonprofit research organizations. Foundries, metal producers, fabricators and their suppliers are sponsoring these projects in both applied and basic research. The volume of such projects has reached multi-million dollar proportions annually. Small companies unable to afford research departments of their own are taking advantage of the extensive facilities and skills of the research institutes. Large companies, with their own research departments, however, still sponsor the bulk of the work.

HAND MILL—Metals can be rolled to a thickness of only 0.003 in. in this miniature rolling mill used in developing special alloys.



Industrial concerns sponsoring research at Battelle run the entire gamut of sizes, from small business firms who carry less than 100 men on their payroll to giant corporations employing many thousands of workers. The research facilities of Battelle permit the small business firm to improve the quality of its products and safeguard the soundness of its manufacturing processes, even though it cannot afford the expense of a research organization of its own.

Some of these small industrial concerns seek aid in developing new products; others have as their objective the improvement in properties or reduction in manufacturing costs of their present products. To the large business enterprises with research laboratories of their own, Battelle makes available ideas bridging many fields of science, as well as equipment and personnel that can serve as a useful adjunct to their own research facilities. In many instances, large business concerns find it expedient to bring their long-term research problems to Battelle, thereby introducing a new approach to their solution, unhampered by pressure of every-day contact with operational problems.

During the past years, small business concerns employing less than 100 workers accounted for roughly 3 pct of the total number of research projects at the Institute. Proportionately, the number of small firms taking advantage of the

Battelle research facilities is on the increase. The dollar volume of research sponsored at Battelle by small business is at present about 1 pct of the total research budget of the Institute.

Typical Small Company Projects

A manufacturer of cast bronze tablets was confronted with a problem of improving the surface smoothness of his castings and developing better methods for coloring the bronze tablets. A small scale project with a budget of less than \$1000 a month was set up on this problem. In the research work on the coloring of these tablets, tests included investigating various methods, such as exposure to gases, electrolytic methods and development of artificial patina by dipping and spraying with various chemicals. To evaluate the quality of coloration, corrosion resistance tests, humidity tests and weathering tests were conducted. The investigation led to a marked improvement in the surface quality and coloration of the bronze tablets produced by this manufacturer.

A gray iron foundry brought in a problem of improving the process of preparing chemically bonded molding sand. Work on this project was carried on in the Battelle foundry and showed gratifying results. Research work for the same sponsor led also to the development of a new product—a very effective patching material for cupola

linings that is now finding wide application in iron foundries.

For several years, Battelle has been engaged in research on improvement in quality of chilled iron and steel shot used for metal peening. This work was sponsored by a small firm employing about 50 workers, and led to a marked improvement in the quality of the product.¹

Improvement of die life in forging; cold drawing of bars and wire; heat treating; metallic coatings by either hot dipping, spraying, packing in power, cladding, electroplating, or vapor deposition—these are but a few examples of problems on which small industry can enlist the research facilities of Battelle. Fuel utilization,



FULLY EQUIPPED—Battelle's ceramic department is equipped for specialized work ranging from refractories to coatings for electrodes.

ceramic, instrumentation, etc., are common problems to large and small industry in which Battelle has a basic interest and for which it has trained men, special equipment and proven methods.

Large Companies Sponsor Basic Studies

As an example of a research project of much greater magnitude, one of the leading primary steel producers in the United States sponsored a basic study of factors influencing machinability of free-cutting steels. As the first step, a thorough appraisal was made of all known laboratory tests of measuring machinability. A new testing procedure was then developed, embodying the soundest principles of existing tests and overcoming their weak points. The new test furnished a machinability index based on the rate of cutting a fixed length of bar in a lathe while the pressure of the tool against the workpiece was kept constant. This test was found to show very satisfactory correlation with results of automatic screw machine operations on a production scale.

With the new machinability test as a yardstick of cutting quality, work was started on the next



UNDER COVER—This induction melting unit is used to melt and cast active metals like titanium under controlled atmospheres.

phase of the project. A large number of induction furnace heats were made and tested for machinability. The most promising leads were followed up by making full-scale heats at the sponsor's plant. These heats were tested in the laboratory and later on automatic screw machines on full-scale production work.

Work on this project was continued for 3½ years. It led to a better understanding of steel-making variables influencing machinability and, last but not least, it resulted in a superior machining proprietary steel.² A patent was issued and assigned by Battelle to the sponsor.

The activity of the manufacturing and production research section at Battelle is devoted to three major fields. They include mechanical engineering, design and development of production machines for special processes, and ideas for manufactured products. Research work carried on in this section has as its main objective the reduction of manufacturing cost by development of automatic processing equipment with resultant savings in labor and improved quality control of the product.

Realizing the part that economics play in guiding and appraising research efforts, Battelle has within its organizational framework an engineering economics section. The function of this group is to make economic surveys ranging in scope from market analyses for new alloys and materials to studies directed toward more efficient use of available production equipment. The economic surveys cover many phases of the metalworking industry, and may include studies of waste product utilization, sources of raw materials, and appraisals of the competitive position of new processes.

Different Divisions Specialize

In the mineral processing section, a staff of about 30 engineers has all the necessary facilities for handling, crushing, concentration and extraction of ores by means of gravity, magnetic, flotation, roasting, leaching, sintering or smelting methods. Metallographic and petrographic laboratories are available for mineral identification.

In addition to facilities for small scale studies, the mineral processing section has a continuous pilot flotation plant, roaster, rotary kilns, Cottrell precipitators, dust collectors, etc. Studies have been conducted on ore samples ranging in size from a few ounces to 200 tons.

In the foundry section, steelmaking equipment includes conventional electric arc and induction furnaces ranging in capacity from 1 to 800 lb, as well as a number of specially designed units in which ingots up to 100 lb can be cast under vacuum or under controlled atmospheres. In current use is a controlled atmosphere arc furnace for melting titanium, zirconium, iron and other metals in water-cooled crucibles to avoid contamination by refractories⁴. Equipment is also available for static and centrifugal casting of steel, iron and other metals, and for investment casting of metals by the lost wax process.

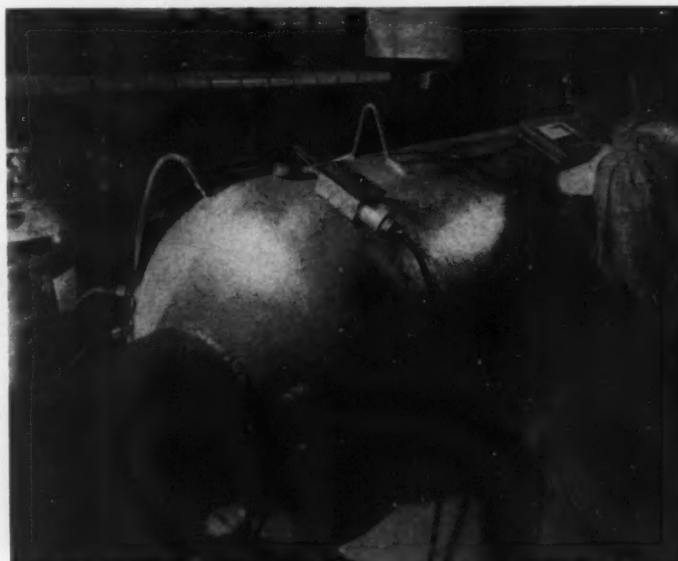
As typical example of equipment designed and constructed at the Institute with specific research problems in mind, the Turbo-Hearth and an experimental cupola have received considerable attention from workers in this field. The Turbo-Hearth was described recently.^{5, 6}

The Institute has a completely equipped heat treating laboratory planned for precision high-temperature work. Equipment is available for heating metals either in conventional controlled atmosphere furnaces, by induction, or by high-speed direct gas heating methods. In the

metal processing section, facilities are available for cold drawing or cold rolling.

The welding research section, with its present staff of 20 engineers and technicians, is equipped for coping with research problems on all phases of joining of metals by either welding or brazing. As an example, special equipment has been designed and constructed for fundamental studies of covered electrode and gas shielded arcwelding.

Mechanical and physical tests are the yardsticks by which the quality of materials is gaged and the applicability of new processes and methods is judged. As essential tools in its research activities, the Battelle laboratories have the necessary machines for static and dynamic tests on a scale that ranges, as an example, from 25 to 200,000 lb in tensile testing. The fatigue laboratory contains 25 testing machines with a top capacity of 60,000 in.-lb in cantilever beam ma-



INSIDE OUT—A technician conducting arcwelding experiments tests inside a controlled atmosphere chamber.

THE LARGE AND THE SMALL—Fatigue specimens weighing from 1 oz to 100 lb are used at Battelle.



chines, and 200,000 lb tensile to 200,000 compression in direct-stress machines. In the high-temperature section, equipment is available for making creep and stress-rupture tests on steel and other metals under controlled atmospheres or under vacuum, at temperatures up to 2900°F.

In the field of nondestructive testing, the facilities of the Institute include well-known conventional equipment, as well as some developed at Battelle. The most spectacular of these is Xeroradiography.⁷

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- ⁶ C. E. Sims and F. L. Toy, "Experimental Operation of a Basic-Lined, Surface-Blown Hearth," *Journal of Metals*, April 1950, p. 694.
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WELDING NOTEBOOK



JOB

Fabrication of jacketed process vats for food industry.

PROBLEM

Sanitary requirements demand smooth interior, necessitating hand grinding of inner surface, after hand plug welding or projection welding of outer jacket to inner tank.

SOLUTION

Former methods replaced by semi-automatic plug welding method.

RESULTS

New method is faster than hand plug welding, stronger than spotwelding, and eliminates 90 pct of hand grinding formerly required.
Data courtesy Nelson Stud Welding Div., Morton-Gregory Corp., Loraine, Ohio

JOB

Assemble aircraft cabin heater from 58 separate aluminum parts.

PROBLEM

Brazing with hand torch required 7 hr per heater.

SOLUTION

Installed an Ajax Salt Bath furnace for brazing.

RESULTS

All 58 joints of each heater brazed simultaneously in 10 min.
Data courtesy Ajax Electric Co., Inc., Philadelphia



JOB

Welding the inside seam joining head to shell of a catalytic processing vessel.

PROBLEM

The required high-quality nonporous welds on outside seam can be made with automatic hidden-arc equipment. But this equipment cannot be used inside, since there would be no way to get it out after head is welded on.

SOLUTION

A manual Lincolnweld unit is used. Operator can take welding cable and gun with him in and out of the tank manhole.

RESULTS

A welding speed of 14 ipm is as much as 100 pct greater than previous hand welding methods used, and the weld is much less critical in tendency towards porosity.
Data courtesy Lincoln Electric Co., Cleveland

JOB

Brazing carbide tips on cutting tools.

PROBLEM

Hand torch brazing too slow.

SOLUTION

Installed induction heating unit for brazing.

RESULTS

Bench model induction heater used. No special holding fixtures necessary. Production has been increased 20 to 30 pct.
Data courtesy Lepel High Frequency Laboratories, Inc., New York

JOB

Spotwelding experimental plane wing components, fabricated from 0.028-in. thick 8630 steel.

PROBLEM

Produce a spotweld with a minimum shear strength of 785 lb per weld. Ordinary single-pulse spotwelding did not have this shear strength, was brittle, hard and porous.

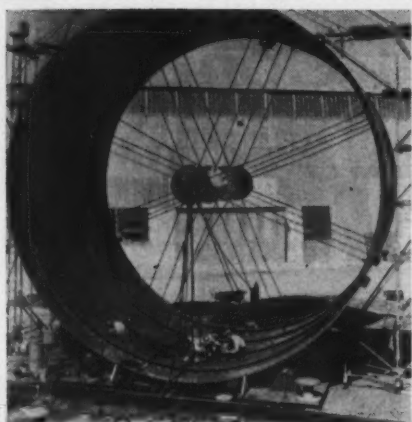
SOLUTION

Pulsation welding was used. First, mechanical pressure was applied, then welding current turned on for five separate intervals of 7 cycles each.

RESULTS

Welds exceeded minimum shear strength requirements, passed penetration and other tests easily.
Data courtesy Leslie Welding Co., Chicago

Practical welding ideas for the production and welding engineer showing by actual case studies how others have solved tough welding and brazing problems.



OB

Making watertight circumferential welds joining together 36-ft-diam sections of an underwater vehicle tunnel.

PROBLEM

Welds must be absolutely watertight, since tunnel sections, fitted with end bulkheads, were to be floated 125 miles to point of use. Sections of 1/2-in plate, weighed 31 tons.

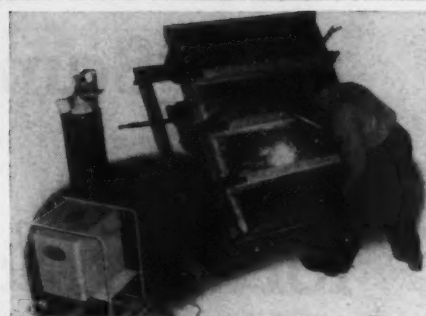
SOLUTION

Special automatic welding turning rolls were constructed to accommodate the great size and weight of these sections. Rolls consisted of five power-driven rollers, and five idler rollers. Power drive was arranged to rotate the sections in one direction at exactly the same speed as the automatic welding equipment travelled in the other.

RESULTS

Accomplishment of the tremendous job of seamwelding 20-ft lengths of cylinder into nine 300-ft sections for transporting, with minimum expenditure of manhours utilizing simple welding procedure.

Data courtesy
Worthington Pump & Machinery Corp.



JOB

Constructing special tanks of 615T aluminum.

PROBLEM

Reduce production time for making 22 ft of 5/16-in. fillet welds.

SOLUTION

Conventional welding methods replaced by Aircomatic welding process.

RESULTS

Welding time per tank, formerly 3 hr, cut to 15 min.

Data courtesy Air Reduction Sales Co., New York



JOB

Making 14 spotwelds, attaching screen wire to frame of air filter assembly.

PROBLEM

Small foot-operated spotwelder slow and fatigues operator. Large 15-kva unit available, but needed for other work. Intermittent demand on this job did not justify tying up funds and floor space by purchase of another 15-kva unit.

SOLUTION

Installed automatic repeat type, air-operated, 5-kva unit.

RESULTS

Low cost of 5-kva unit justifies leaving it set up for this one job, even though not constantly in use. Unit is portable, can be stored out of way when not in use. With no operator fatigue, unit turns out work 200 pct faster than foot-operated machine did.

Data courtesy Delta Mfg. Div.,
Rockwell Mfg. Co., Milwaukee

JOB

Fastening cable heads and access hatch covers to subway-type transformer boxes.

PROBLEM

Since boxes must be completely watertight, through bolt holes cannot be used. Heavy bosses were built up of layers of welded plate, into which blind bolt holes were drilled and tapped. This method costly, slow, and adds to weight of unit.

SOLUTION

By studwelding, studs are attached directly to sheet steel transformer case. Need for heavy bosses and watertight welds around them eliminated.

RESULTS

Savings as high as 20 pct of the total finished product cost are realized.

Data courtesy Nelson Studwelding Div.,
Morton-Gregory Corp., Loraine, Ohio

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Sample at Random

for Correct Statistical Control

By **DORIAN SHAININ**

Chief Inspector, Hamilton Standard Div.,
United Aircraft Corp., East Hartford, Conn.



COMPLETE inspection of each and every part in a lot is often a very poor way of finding out if the parts all meet specifications. Many production executives know this. What a lot of them do not realize is that inspection of a sample—part of statistical quality control—is a better way but only if it is done properly. Usually it is not done according to calculated risks and the results are invalid. The same common error applies in destructive testing (i. e., tensile tests). Improper sampling is the root of most of the trouble.

Fig. 1 shows how risk varies with sample size. The vertical scale is risk represented as the average outgoing quality limit (AOQL). This measure of risk serves as a common denominator for making a comparison among the data covered by the chart. AOQL is defined as the greatest percent defective that one can encounter in the long run in the accumulated aggregation of accepted lots. But if one or more defectives are

found in any sample that sample lot must be completely inspected and all defective items replaced by good ones. In other words, the only lots put into the store room are those from which a sample shows no defectives and/or lots which are known to contain no defectives as a result of the thorough detailing.

To obtain the protection of a selected value of AOQL the sample pieces must be selected from the lots *strictly at random*. This essential is overlooked in practically every plant employing sampling plans either because of a lack of appreciation of its importance or apparent inability to select the sample so that each and every piece of the lot has an equal opportunity to be selected. The only practical way of doing this—short of tumbling to get all the items thoroughly mixed before selecting the sample—is to assign a number to each item of the lot and draw the sample from a list of strictly random numbers. These numbers can be obtained from a table¹ of such

Many production executives now concede that certain statistical quality control methods are often more accurate than 100 pct inspection. But in a great many cases bad technique is used and the results are worse than nothing. Proper sampling is a must in statistical quality control. It is also essential in destructive testing work.

numbers mathematically tested for randomness.

In preparing the list one is in effect picking a quantity of successive numbers from the table equal to the size of the sample, but is using only the numbers which are numerically equal to or less than the lot size.

Fig. 1 then pictures the reduction of risk which accompanies an increase in the sample size provided the samples are truly random and provided lots rejected where one or more defectives appear in the sample are screened. The effect on this relation of lot size is minor. The risk is higher for a given sample size when the lot size is larger but it quickly diminishes as the lot size increases; for all practical purposes it disappears for lots of 500 or more.

Another feature of this chart is the distinction between sampling by attributes and sampling by variables. Sampling by variables lowers the risk for a given sample size: It means recording the measurement of the characteristic being checked and then analyzing two features of the distribution of these measurements (average value and standard deviation) plotted against their frequency of occurrence.

In sampling by attributes the only thing recorded concerning the individual pieces is whether or not they are acceptable.

The chart is strictly theoretical. It is true only when inspection of the sample is conducted without oversight. This requirement should not be difficult when the lot size is small, but when lots exceed about 50 pieces a human failing, inspector fatigue, sets in and causes oversights. Obviously the more pieces being inspected the more routine becomes the task and monotony has a more telling effect. Other factors which make the work more or less effective are: How often and how much the inspector is distracted; the type of gaging; working conditions; and even the mental condition of the inspector.

That such conditions are characteristic of most inspection is easily demonstrated by re-checking material purportedly cleared of defectives by a previous inspection. An example is shown in the accompanying table. Other examples of human failing are shown by running tests with marked beads or other objects to show

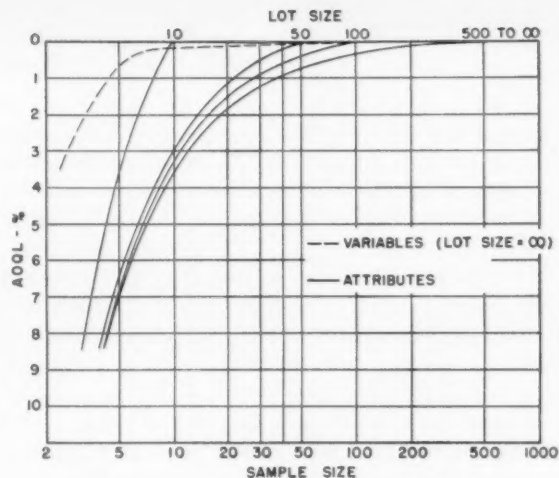


FIG. 1—An increase in sample size reduces the risk in sampling provided the samples are truly random and lots with one or more defectives are screened.

that when the conditions are such as to encourage these failings it is impossible to avoid them.

MacNiece² has reported a case where 100 pct inspection showed only 85 pct reliability. Re-inspection (i. e., 200 pct inspection) boosted the figure to 89 pct; and 300 pct inspection gave only 92 pct reliability.

Adverse conditions are minimized when the amount of material inspected is low and when the inspector has to stop and record the measurements instead of just putting work into acceptable and non-acceptable piles. Fig. 1 shows that the most desirable type of sampling plan would be the variable or measurement method. Certain things, however, can only be checked by the attribute method. Some examples are the inspection of X-ray pictures, the magnetic or non-magnetic checking of parts for defective regions, and the use of go and no-go thread plug gages for small diameter threads (for which no successful indicator-type internal diameter gages have yet been devised).

Monotony Breeds Errors

If it is impossible or impractical to inspect by variables, then specific practices should be followed to reduce the oversights of the larger and attribute type samples. Checking methods should be used to see how close results are to the theoretical mathematical protection of the plan.

Practices that make it "easy" for the inspector but at the same time increase the monotony of the checking operation breed trouble. At the other extreme, the inspection operation should not be "difficult" in certain respects. The use of scales or micrometers in repetitive checking leads to oversights.

Fig. 2 is a chart to help tell whether the inspection control is effective to a selected degree of assurance. Based on probability mathematics, it indicates—for various numbers of successive pieces one encounters without coming across a

SAMPLE VS. 100 PCT INSPECTION

No. of Pieces Produced per Order	Min. No. of Rejects Calculated from Sample Inspection*	No. of Rejects Removed by 100 Pct Inspection	Percent Efficiency
20,659	431	248	57.5
28,470	54	39	72.2
15,620	107	61	57.0
5,545	4	4	100.0
10,338	90	51	56.7
10,200	202	95	47.0
11,000	123	59	48.0
101,832	1,011	557	57.1 (Avg.)

* From "Control Charts in Factory Management".⁵

defective piece—the maximum per cent defective situation of a process that would be encountered as seldom as the difference between 100 and the number marked on the curves under “Assurance—%.”

For example, assume an inspector had released 800 carefully inspected articles to his assembly floor. Part of his checking involved a dimension that was held to certain limits to insure its fitting properly into the assembly. Then the fact that he received no complaints after all the pieces were assembled would indicate that he could be 90 pct certain that the worst per cent defective that could get by his control was just under 0.3 pct. Of course this is only true if in releasing the 800 parts he had rejected at least one that could not have been assembled. Obviously, if he had not rejected at least one such part, he has absolutely no measure of the effectiveness of his inspection; his success was due to production of good articles and not to his ability to find defective ones.

Suppose one has established a sampling plan which seems to control quality sufficiently well so

that customers have had no complaints to register for a reasonably large number of successive items. Then suddenly one complaint is received. The company wonders if this means that some important part of its sampling plan is being neglected. For this situation Fig. 3 has been prepared. It is a chart similar to Fig. 2 but the vertical scale now gives the number of successive readings which include the one or “isolated case” complaint. For this chart, as one would expect, the per cent defective is considerably more severe for a given assurance and the given number of successive pieces.

There are two types of sampling plans by variables that are practical enough to be used by anyone able to meet the minimum job requirements of dimensional inspectors or laboratory technicians. One could be described as a plan which controls the averages of the measurements,³ and the other is the author's Lot Plot plan.⁴ The first plan is economically suited for destructive inspection. Under it one determines a reasonably small sample size by substituting in straightforward mathematical relations the two types of risk one is prepared to take: (1) The risk of very seldom rejecting a lot when its per cent defective is at a picked low value which, without question, should be considered acceptable; and (2) the risk

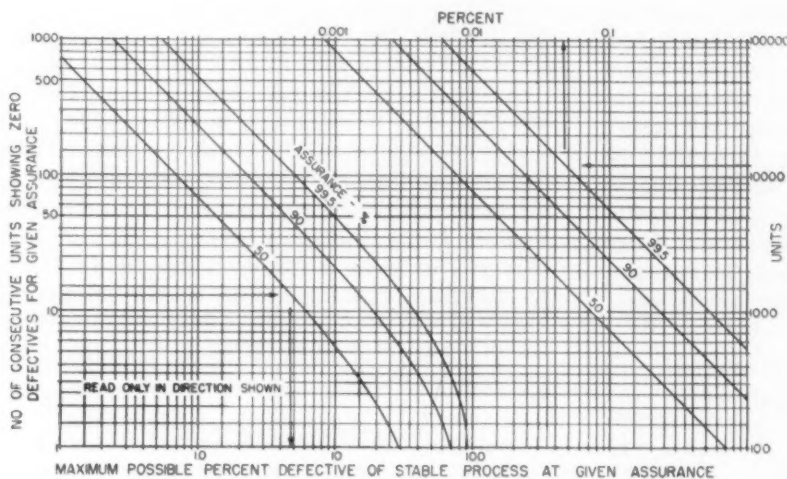


FIG. 2—Based on probability mathematics, this chart tests the effectiveness of the control action by showing the maximum percent defective likely to be encountered.

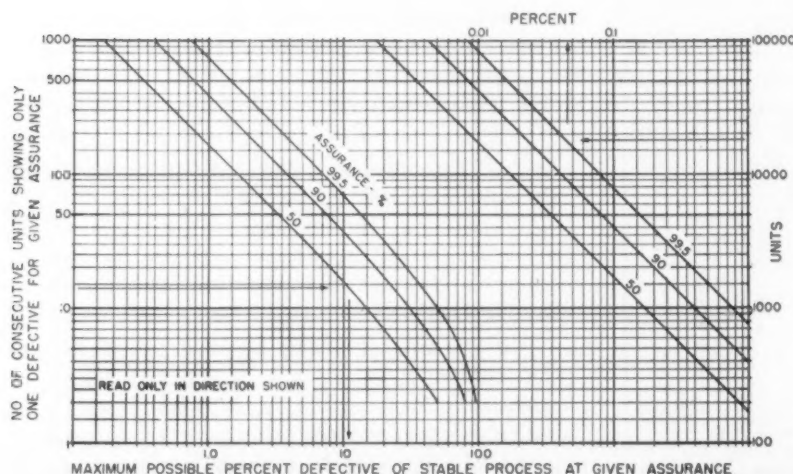


FIG. 3—Similar to Fig. 2, this chart is designed to determine whether a lone complaint is sufficiently isolated to warrant withholding expensive corrective action.

HAMILTON STANDARD LOT PLOT AND QUALITY REVIEW ORDER

VENDOR W. & G. Co PART NAME CAP PART NO. 73201
P.O. NO. 321614 R.S. NO. 290667 QUANTITY 438 DATE INSP 8-26-50
SPEC. .246-.256 WIDTH INSPECTOR BROWN SAMPLE SIZE 50

VALUE	LINE IND. NO.	5	10	15	20
	+10				
	+9				
	+8				
	+7				
	+6				ULL
.259	+5	2			
.258	+4	2 X X			
.257	+3	2 4 6 8 X			
.256	+2	3 4 5 6 8 8 9			SPEC. +6
.255	+1	2 3 6 7 9 9 X			+2
.254	0	1 1 4 4 5 7			X
.253	-1	1 2 3 3 6 6 9 X			-1
.252	-2	1 3 4 5 7 8			
.251	-3	1 5 5			
.250	-4	7 7 8			
.249	-5	9			
.248	-6				
.247	-7				LLL
.246	-8				SPEC
	-9				
	-10				

PLEASE!
ASK YOUR OPERATOR TO STUDY THIS DIAGRAM AND--

RANGE	
1	3
2	6
3	4
4	5
5	5
6	4
7	5
8	7
9	7
10	5
11	
12	
13	
14	
15	

☒ MOVE BASIC PRODUCTION SIZE (TOOL SETTING, DIE SIZE, MOLD CAVITY, ETC.) .0025 IN LOW DIRECTION

☒ REDUCE PROCESS SPREAD AT LEAST .0032

☐ MAKE THE TWO BASIC PRODUCTION SIZES CENTER AT _____

☐ EXPLAIN WHY RED CIRCLED PIECES WERE LEFT IN THE LOT

IF SOME OF THE ABOVE ARE CHECKED, LOOK FOR NEXT LOT PLOT TO SEE IF YOUR ADJUSTMENTS WERE SUCCESSFUL

☐ ACCEPT OUR CONGRATULATIONS FOR A GOOD JOB! THE OTHER SIDE OF THIS SHEET TELLS YOU HOW TO GET A CHECK MARK IN THIS LAST BOX ALL THE TIME

2R = 51
30 = 6.6
2X = +7
X = +14

DISPOSITION		BEYOND	%	EXTENT	ATTRIBUTE SAMPLE DATA	
ACCEPT (CO. INSP.)		HIGH SPEC.	15	.00425	SAMPLE OF _____ SHOWS _____ PIECES _____	
Q.R. ACCEPT (HS QR)	<u>R.H.W.</u>	LOW SPEC.	O.K.			
GOV'T. INSPECTOR	<u>R.H.H.</u>					

FIG. 5—The Hamilton Standard Lot Plot form is really a quality control package. The reverse side of the form (not shown) gives directions for preparing and interpreting a quality control chart so that a process may be kept running economically and efficiently within statistical control.

of accepting a lot having a particular per cent defective poor enough so that one would desire such a lot to be rejected practically all of the time. In order to be able to operate with these economically small sample sizes, an important assumption is made. That is that the measure of inherent variation (standard deviation) of the characteristic being measured in lot after lot remains substantially constant; and along with this, the distribution of that characteristic reasonably approximates that of a normal or Gaus-

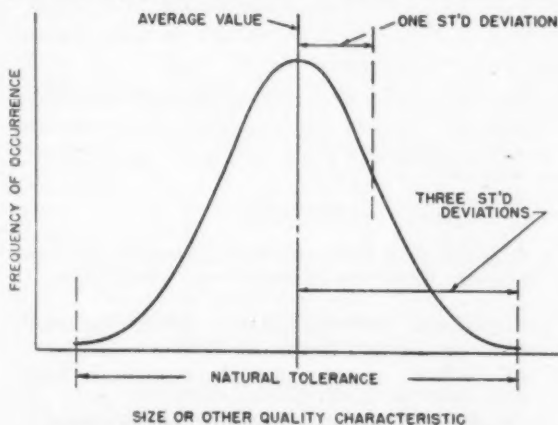


FIG. 4—A plot of random values against the frequency at which they will occur fills out into a pattern like this bell-shaped one characteristic of certain chance events.

sian curve (Fig. 4). Users of this method should employ an additional computation for each sample to confirm the assumption of a reasonably constant standard deviation as being valid.

The Lot Plot plan is particularly suited to non-destructive inspection by variables, and it is not hampered by any assumptions. The sample size is constant, 50 pieces, and the measurements are entered on a form (Fig. 5) which permits determination of the most likely largest and smallest pieces in the lot regardless of the size of the lot.

The plan was developed around this analogy: When one goes to a doctor for a physical check, part of the usual procedure is a jab with a needle to obtain a sample of blood. The doctor and patient are both confident that the analysis of this sample will reveal the condition of all the blood in the body—the sample should contain each element in the same proportion as it is in all the blood.

In the handling of material in lots in a shop, each lot is considered as a human being and the plan is an industrial sampling counterpart for each specification to determine the "condition of the blood."

The problem of developing the plan was approached with primary emphasis on improving the accuracy of results over 100 pct inspection methods. The human angles of 100 pct inspec-

tion mentioned previously had to be overcome. Another serious situation which can be particularly encountered in a go and no-go or "attribute" type of statistical sampling is the inspector concluding when he finds one defect over the permissible number of defects in the sample, that cruel fate had caused it. He may very well be thus influenced not to report the rejection, particularly if it would mean a considerable amount of extra inspection on his part in order to screen the entire lot. Subordinate to this goal of minimizing the human element was the desire to reduce costs.

In determining the disposition of a lot of material received from a producer, the inspector conducts a statistical sampling of each specification involved and records a picture or plot of the requirements as it is found in that lot. Three important features of this picture or Lot Plot are the average value, the spread or dispersion of the values and the shape of the distribution of values which are plotted against their frequency of occurrence.

First, the sample must be generally representative of the picture of the entire lot, just as the blood sample is. It is possible to draw nonrepresentative samples as well as representative ones, but a nonrepresentative one from a thoroughly mixed lot is unlikely. Since there are many practical obstacles to shuffling parts, it was instead decided to shuffle the selection of them by the use of the random numbers described earlier. The selection of parts will thus be entirely by chance and the use of successive samples from the same lot, using different lists of such random numbers, will give a remarkable similarity of appearance.

Just how representative the sample will be depends upon how true or accurate the values are that are determined for the average and spread of the distribution. It is a natural law, just like gravity, that provided the selection is a chance one the *average values* found from successive samples will vary in a pattern like that of Fig. 4. Similarly the values found for the dispersion of sizes in the samples will also approximate such a distribution. The central point of each such distribution, i. e., the value that comes up most often, is the true value.

Now, some other favorable characteristics of the laws of chance are that the larger the size of the sample, the narrower are the main bodies or areas of these distributions of average and of dispersion values. This increases the accuracy of the information. Further, when their combined effect is considered (to give an indication of the position of likely extreme values of the material being sampled) even this indicated position of these extreme values will vary among trials in accordance with the pattern of Fig. 4. ("Extreme

values" means the number of units of sampled dispersion away from a sample average.) This relation can be expressed mathematically.

This bell shaped "normal" pattern, so characteristic of certain chance events, serves as a measure of the likelihood of events. It therefore follows that one should be able to determine from sampling the position of likely extreme values to any degree of certainty, short of 100 pct.

Fortunately the sample size of 50 pieces is small enough so that the human element of inspector fatigue is not encountered. It can even be further minimized by checking several specification requirements in sequence on say, five pieces, to bring variety into the inspector's work.

Simple instructions show the inspector how to fill out the Lot Plot form. Included is a chart of the 11 basic types or shapes of distribution that can be encountered.

For products that do not have such critical safety requirements an almost obvious recommendation lurks among these statements about the Lot Plot plan. The permissible use of AOQL's that are not tight economically invites the use of attribute sampling. When a sample is found to contain more than the allowable defects, the rules call for 100 pct screening. Usually the lot size is fairly large so why not prepare a Lot Plot at this stage? The resulting estimate of per cent defective can then be compared with the allowable AOQL and the extent of the error is determined. Both of these factors help to decide whether screening will even be necessary.

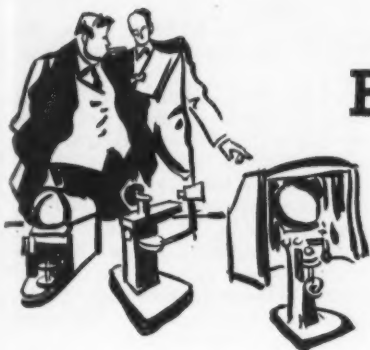
In many cases the need for screening will be confirmed by the Lot Plot, but now the bugaboo of inspection fatigue which can affect the 100 pct inspection has had a restraining check upon it. The approximate number of defective pieces to be found and to be removed from the lot is known. The Lot Plot, moreover, will give the producer the necessary information for corrective action.

The Lot Plot form illustrated (Fig. 5) is actually a quality control package in that the right-hand portion contains notations which would be checked by the inspecting agency to indicate to the producing agency the type of correction, if any, which is needed to make future lots more acceptable.

The chart will keep the process running within "statistical" control which means less scrap and rework and usually *some* increased production.

References

- ¹ M. G. Kendall and B. Babington Smith, *Tables of Random Sampling Numbers*, Cambridge University Press, 51 Madison Avenue, New York, N. Y.
- ² E. H. MacNiece, "Statistical Control v. 100 Pct Inspection," *Standardization*, June 1949.
- ³ Paul C. Clifford, "Acceptance Sampling Inspection by Variables", *Industrial Quality Control*, March, 1947, p. 12.
- ⁴ Dorian Shainin, "The Hamilton Standard Lot Plot Method of Acceptance Sampling by Variables", *Industrial Quality Control*, July 1950, p. 15.
- ⁵ Reprinted by permission from "Control Charts in Factory Management" by W. B. Rice, John Wiley & Sons, Inc., 1947.



EXHIBITORS

AT THE NATIONAL METAL EXPOSITION

October 23-27

A list prepared by the editors of THE IRON AGE to tell visitors who is exhibiting and what they will feature, with their booth numbers, at the International Amphitheatre, Chicago.

Acme Mfg. Co., Detroit 16. Special machinery, polishing and buffing machinery, grinders, welding positioners. Booth 218.

Acme Steel Co., Chicago 8. Acme-Morrison metal stitcher. Booth 623.

Air Reduction Sales Co., New York 17. Aircomatic process, portable shape cutter, other welding and cutting equipment. Booth 422.

Ajax Electric Co., Inc., Philadelphia 23. Ajax Hultgren salt bath brazing furnace, over 200 sample treated products. Booth 1501.

Ajax Electrothermic Corp., Trenton 5, N. J. Induction furnaces for heating for forging, and for smelting and specialized applications. Booth 1501.

Ajax Engineering Corp., Trenton 7, N. J. Induction melting furnaces. Booth 1501.

Allen Mfg. Co., Hartford, Conn. Hex and socket head screws, plugs, cap screws, nuts. Booth 702.

Allison Co., Bridgeport, Conn. Rubber bonded and resinoid bonded abrasive cut-off wheels. Booth 1706.

Alloy Engineering & Casting Co., Champaign, Ill. High temperature heat and corrosion resistant castings. Booth 1702.

Alox Corp., Niagara Falls, N. Y. Rust preventive compounds, oil additives. Booth 2441.

American Brake Shoe Co., New York 17. Heat and corrosion resistant castings, cast iron, steel forgings. Booth 2024.

American Brass Co., Waterbury, Conn. Non-welded brass coils. Booth 2002.

American Chain & Cable Co., Inc., Bridgeport, Conn. (See Campbell Machine Div., Wilson Mechanical Instrument Co.) Booth 519.

American Cyanamid Co., New York 20. Easy washing carburizing compounds, calcium cyanamid, nitrogen ladle addition for steel. Booth 1808.

American Forge Div., Chicago 2. Forgings. Booth 2024.

American Gas Furnace Co., Elizabeth, N. J. Heat treating furnaces, gas burners. Booths 920 & 925.

American Lava Corp., Chattanooga 5, Tenn. Steatite ceramics, insulation. Booth 2514.

American Machine & Metals, Inc., East Moline, Ill. (See Riehle) Booth 2025.

American Manganese Steel Div., Chicago Heights, Ill. Hard facing welding rods, manganese steel castings. Booth 2024.

American Nickeloid Co., Peru, Ill. Nickel zinc, chrome zinc, brassoid, copperoid, nickel steel, chrome steel. Booth 2619.

American Non-Gran Bronze Co., Berwyn, Pa. Precision machined aircraft engine and propeller parts, bronze castings, Ni-resist cast iron and beryllium machined parts.

American Optical Co., Buffalo, N. Y. Metallograph. Booth 618.

American Steel & Iron Works. Booth 1916.

American Platinum Works, Newark, N. J. Silver Brazing production parts on automatic machine, silver brazing alloys. Booth 1902.

American Wheelabrator & Equip't Corp., Mishawaka, Ind. Swing table and tumblast units operating with dust collections. Booth 1216.

F. E. Anderson Oil Co., Portland, Conn. Lusol, machine cleaner, water conditioner, rust preventives, cutting fluids. Booth 2225.

Aronson Machine Co., Arcade, N. Y. Positioners. Booth 2427.

Atkins & Co., E. C., Indianapolis 9. Hacksaw cutting, metal saws and files. Booth 2653.

Austen Laboratories, Inc., Chicago 37. High temperature precision investment castings for industrial and aircraft use. Booth 121.

Automotive Industries, Philadelphia 39. Publications, reprints. Booth 2538.

Babcock & Wilcox Co., New York 6. Allmul firebrick, other firebricks, refractory castables, plastics and mortars. Booth 2617.

Babcock & Wilcox Tube Co., Beaver Falls, Pa. Carbon, alloy and stainless seamless and welded h-f, c-d and rocked tubing. Booth 2609.

Baker & Co., Inc., Newark, N. J. Industrial and laboratory furnaces, purifiers and dryers. Booth 2215.

Baldwin Locomotive Works, Eddystone 42, Pa. Universal Testing Machines, tensile fatigue and impact machines. Booth 407.

The Balmar Corp., N. A. Strand Div., Chicago 40. Flexible shaft machine. Booth 2685.

Bausch & Lomb Optical Co., Rochester, N. Y. Metallograph, metalurgical instruments. Booth 502.

Bede Products, Inc., Cleveland. Paint heaters. Booth 2402.

Bendix Westinghouse Automotive Air Brake Co., Elyria, Ohio. Air con-

trols, cylinders, valves for holding, clamping, etc. Booth 2021.

Beverly Shear Mfg. Co., Chicago 43. Metal cutting shear. Booth 2623.

Black Drill Co., Cleveland. Drills, burring, chamfering and counter-sinking unit. Booth 722.

Blackstone Mfg. Co., Inc., Chicago. Power driven and gravity roller conveyors. Booth 2552.

G. S. Blakeslee & Co., Chicago 40. Solvent degreasers and metal parts washers. Booth 2203.

V. A. Bokar & Sons, So. Minneapolis 6. Stampings. Booth 1715.

Bradley Washfountain Co. Milwaukee, Wis. Group washroom equipment. Booth 401.

Brainard Steel Co., Warren, Ohio. "Strap-O-Matic" Tool, lightweight sealers, steel strapping, tools and accessories. Booth 2509.

Brown Instruments Div., Philadelphia 44. Potentiometers, pyrometers, flow meters, thermometers, remote type instruments. Booth 1802.

Charles Bruning Co., Inc., New York 13. Office model Whiteprinter. Booth 2666.

Brush Development Co., Cleveland. Surface analyzer and universal strain analyzer, dual channel dc amplifier, direct inking oscillograph. Booth 2536.

Buehler, Ltd., Chicago 1. Speed press, metallographic grinder and polishers. Both 615.

Bundy Tubing Co., Detroit 4. Tubing. Booth 507.

By-Products Steel Co., Coatesville, Pa. (See Lukens Steel Co.) Booth 1625.

Campbell Machine Div., Bridgeport, Conn. Abrasive cutoff machine, nibbler. Both 519.

Champion Rivet Co., Cleveland 5. Welding electrodes, electrode extrusion line, cold and hot upset forgings. Booth 1830.

Chicago Metal Hose Corp., Maywood, Ill. Flexible metal hose and tubing, bellows, expansion joints, aircraft assemblies. Booth 714.

Chicago Rivet & Machine Co., Bellwood, Ill. Automatic rivet setting machines, tubular and split rivets. Booth 2628.

Chicago Screw Co., Chicago. Automatic screw machine in operation, screw machine products. Booth 2627.

Chicago Steel Foundry Co., Chicago 32. Heat and corrosion resisting alloy, high tensile and wear resisting alloy. Booth 2003.

Cincinnati Milling Machine Co., Cin-

METAL SHOW EXHIBITORS

(Continued)

cinnati, Ohio. Flame hardening machine, surface hardening auto parts. Booth 2534.

Circo Products Co., Cleveland. Metal cleaning equipment.

Cities Service Oil Co., New York 5. Industrial lubricants and coolants. Booth 1903.

Mark Clayton & Co., Evanston, Ill. Steel tubing. Booth 2542.

Climax Molybdenum Co., New York. Booth 1724.

Clinton Machine Co., Clinton, Mich. Electrical machine for piercing hard metals. Booth 201.

Combustion Control Corp., Cambridge, Mass. Flame-failure safeguard and boiler feedwater controls. Booth 920.

Commander Mfg. Co., Chicago 24. Multiple spindle drill head, tapping head, drill chip breaker. Booth 402.

Commercial Shearing & Stamping Co., Youngstown. Complete hydraulic circuit, forgings, stamping, hydraulic products. Booth 2115.

Consolidated Engineering Corp., Pasadena, Calif. Recording systems, spectrometers, computers, analyzers. Booth 2436.

Continental Industrial Engineers, Inc., Chicago 3. Automatic mass production line. Booth 925.

Cooley Electric Mfg. Corp., Indianapolis 7, Ind. Heat treating electric furnaces. Booth 2647.

Crane Packing Co., Chicago 13. Lapping machines, packings, mechanical seals, electric tube rolling control for condensers and heat exchangers. Booth 2106.

Dake Engine Co., Grand Haven, Mich. Engines, hoists, marine auxiliaries, castings. Booth 1210.

Delaware Tool Steel Corp., East Wilmington 99, Del. Tool steel, pneumatic and hand tools, punches, dies. Booth 2624.

Delta Mfg. Co., Milwaukee 1. Automatic repeat type spot welder. Booth 2701.

Despatch Oven Co., Minneapolis 14. Despatch CF furnace. Booth 2747.

Detrex Corp., Detroit 32. Degreaser with rotary internal conveyor, rotary drum washer. Booth 2222.

Detroit Testing Machine Co., Detroit 13. Sheet ductility testers, brinell hardness and tensile testers. Booth 314.

Harry W. Dietert, Co., Detroit. Sand and metal control equipment. Booth 823.

Distillation Products Ind. Div. Eastman Kodak, Rochester, N. Y. Vacuum systems, gages, furnaces. Booth 719.

The Diversy Corp., Chicago 13. Cleaning compounds, plated metal parts. Booth 619.

DoALL Co., Des Plaines, Ill. Line grinding method of machining hardened steel; cut off machine, surface grinders, high speed band machine. Booth 606.

Dow Furnace Co., Detroit, Customers' parts. Booth 2735.

Dreis & Krump Mfg. Co., Chicago 36. Press brakes, box and pan hand brakes. Booth 1602.

Wilbur B. Driver Co., Newark, N. J. Heat and corrosion resistant alloys, wire ribbon and strip. Booth 115.

Du-Wel Metal Products, Inc., Bangor, Mich. Booth 1715.

Eastman Kodak Co., Rochester, N. Y. X-ray film and supplies. Booth 423.

Eclipse Fuel Engineering Co., Rockford, Ill. Gas shut-off valve, sealed burners, air control valves. Booth 920.

Ekstrand & Tholand, Inc., New York 17. Powder iron, powder parts. Booth 423.

Elastic Stop Nut Corp. of America, Union, N. J. Rollpin, stop nuts. Booth 123.

Electric Furnace Co., Salem, Ohio. Gas fired, oil fired and electric furnaces. Booth 1011.

Electro-Alloys Div., Elyria, Ohio. Heat and corrosion resistant alloy castings. Booth 2024.

Elgin National Watch Co., Elgin, Ill. Fatigue resistant spring alloy. Booth 318.

Elox Corp. of Michigan, Clinton, Mich. Electron drills. Booth 2407.

Edward Ermold Co., N. Y. Automatic unpacker, automatic multiple labeller. Booth 509.

Eutectic Welding Alloys Corp., New York 13. Welding Alloys, fluxes, electrodes. Booth 2202.

Farmers Engineering & Mfg. Co., Pittsburgh, Pa. Intercommunication systems, electronic fences for farms. Booth 2723.

Fawick Airflux Co., Inc., Cleveland, Ohio. Clutches and brakes, Rotor-seals, quick release valves. Booth 1521.

R. Y. Ferner Co., Boston, Mass. Microscopes, camera, fatigue and hardness testers. Booth 214.

A. Finkl & Sons Co., Chicago 14. Booth 1911.



Fisher Scientific Co., Pittsburgh 19. Induction carbon apparatus, Steel-sorter, Carbanalyzer, Electrograph, Gram-atic Balance. Booth 179.

Foster Transformer Co., Cincinnati, Ohio. Remote Control for DC arc welding machines. Booth 2465.

Fostoria Pressed Steel Corp., Fostoria, Ohio. Infra-Red heating equipment. Booth 718.

Gamma Scientific Co., Long Island, N. Y. Vertical camera for photomicrography. Booth 418.

Gas Appliance Service, Inc., Chicago 14. Roto-flame furnace, Ziz-zag burners, gas/airmixers and a utility air heater. Booth 925.

General Alloys Co., Boston 27. Gas carburizing fixtures, trays, conveyor

belts, links, heat treating pots. Booth 906.

General Aniline & Film Corp., New York. (See Ozalid Division.) Booth 1527.

Goldsmith Bros. Smelting & Refining Co., Chicago. Brazing dissimilar metals, silver brazing alloys, fluxes. Booth 2419.

B. F. Goodrich Co., Akron, Ohio. Rivnut blind fasteners. Booth 2007.

Claud S. Gordon Co., Chicago 16. Industrial furnaces, core hardness tester. Booth 925.

Hacker, William J., Inc., New York 5. Camera microscope, fluorescent equipment. Booth 2453.

Hakim, Lawrence, Cicurel, Inc., New York. Band saw with round blade. Booth 2449.

Hamilton Mfg. Co., Two Rivers, Wis. Auto shift tables. Booth 2727.

Handy & Harman, New York 7. Low temperature silver alloy brazing. Booth 1606.

Harper Electric Furnace Corp., Niagara Falls, N. Y. High temperature electric furnaces. Booth 2554.

Harnischfeger Corp., Milwaukee 14. Welding equipment, low hydrogen electrodes, zip-lift electric hoist. Booth 208.

C. I. Hayes, Inc., Providence, R. I. Electric furnaces for heat treating and brazing. Booth 306.

U. C. C. Haynes-Stellite Div. Kokomo, Ind. Mechanized hard-facing, plastic patterns for investment castings, hard facing materials, tools, alloys. Booths 901, 1001, 1101.

Heli-Coil Corp., Long Island, N. Y. Screw thread insert. Booth 2442.

Heppenstall Co., Pittsburgh, Pa. Shear knives and tongs. Booth 2634.

Hesse Machine & Mfg. Co., Boston, 21. Product design, engineering, production machine work tools and dies, stampings, special machinery. Booth 241b.

Hevi Duty Electric Co., Milwaukee. Shaker hearth furnace, laboratory furnaces. Booth 1931.

H. & H. Tube & Mfg. Co. Detroit 17. Brass, copper tubing. Booth 1707.

Hitchiner Mfg. Co., Inc., Manchester, N. H. Precision investment castings. Booth 2415.

Holcroft & Co., Detroit 10. Batch type gas atmosphere furnace. Booth 614.

Charles A. Hones, Inc., Baldwin, N. Y. Gas-fired oven furnaces, burners. Booth 920.

E. F. Houghton & Co., Philadelphia 33. Martempering in liquid salt baths, heat treating, fast quenching oil. Booth 728.

Howard Foundry Co., Chicago. Castings. Booth 101.

Hydropress, Inc., New York. Marform process. Booth 2717.

Illinois Testing Laboratories, Inc., Chicago 10. Instruments for measuring temperature air velocity, dew point, temperature controls. Booth 819.

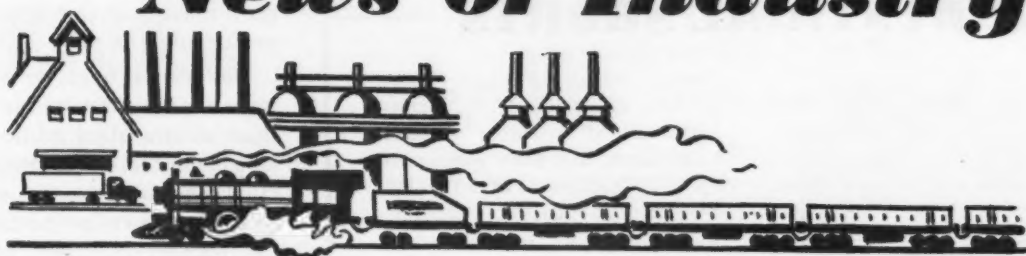
International Nickel Co., N. Y. 5. Properties and uses of nickel alloys, Ductile iron, platinum. Booth 1107.

Monel, Inconel, welding rod, sand and precision castings. Booth 1120.

Interstate Machinery Co., Inc. Chi-

Turn to Page 240

News of Industry



Enough for This Christmas

Bridgeport, Conn.—Although production of appliances will continue at unaltered record levels for the balance of 1950, General Electric Co.'s appliance output will be cut back by about 20 pct in 1951 because of diversion of materials to defense production, said H. L. Andrews, vice-president in charge of the appliance and merchandise department.

He admitted that the supply of materials "is tightening" but foresaw a record output of 12 million units this year. Continued high production through the final quarter should assure adequate supplies of appliances for the Christmas trade, he stated.

Nonferrous Founders to Meet

Chicago—The annual meeting of the Nonferrous Founders' Society will be held Oct. 14 at the Hotel Statler, Boston, Mass. A discussion of government controls and NPA orders will follow an address by Commander Clarence Cisin, USN, of the Munitions Board, on the relationship of the Munitions Board and trade associations.

Titanium Plant to Be Enlarged

Sayreville, N. J.—National Lead Co. has announced plans for construction of additional manufacturing area at its titanium plant here. Work on the project, which will expand facilities for production of titanium dioxide pigments, is scheduled for completion in Jan. 1952.

Nickel Shortage Causes Steel Substitutions

Tardy stockpiling blamed for shortage . . . Foundries use leaner alloys . . . Steel industry reverts to wartime steel . . . Defense priorities won't mean too much—By D. I. Brown.

New York—The metalworking industry will have to use a lot of ingenuity to cope with the shortage of nickel. Belated government stockpiling is creating an artificial shortage. Already substitution programs on constructional alloy steels have been put into effect. Foundries making heat resisting chrome-nickel analyses are using leaner alloys wherever possible, but available supplies cannot be stretched much further.

The steel industry has already gone back to the National Emergency steels of World War II. Consumers are being told they cannot have the 3, 5 and 9 pct nickel grades. These steels for corrosion applications just aren't for sale. Customers must take leaner chemistries, knowing that the parts are not going to stand up as long in service.

Have Right to Stand in Line

Some customers still believe that they will be granted exceptions because they have defense orders. Under the program, at the moment, their military order number merely represents the right to stand in line and beg for nickel. With the AISI 2300 and 2500 series not available, customers have the choice of the leaner nickel chemistry—but even the 4300 series is being substituted for. Consumers using the 1½ to 2 pct 4300 series are being asked to take instead the 9800 series of 0.085 to 1.15 nickel. The harden-

COMMON HEAT RESISTANT STEELS

Usually Produced as Castings

Cr (Pct)	Ni (Pct)
25.0	12.0
16.0	35.0
12.0	60.0
15.0	65.0

ability of this grade is about equal to the 4300 series, but in the 4340 grade, the right substitute hardenability-wise is 9845. Some consumers have difficulty welding the 9845 because of the higher carbon content and they are planning to descend on Washington very soon if the situation continues.

The AISI 4600 series is being diverted to the old NE 8600 series which is now a standard grade. For straight carburized gears and similar parts, this substitution does not hit the customers too hard. However, the 4600 carburizing grades used in roller bearings cannot employ straight 8600 steel as a substitute. In the case of bearings, the industry is fast reverting to the old wartime chemistry RBEC 4720.

Truck Makers May Get 4800

Probably the only consumers who will continue to receive the 3¼ to 3¾ nickel steel, the AISI 4800 series, will be the makers of carburized gears in truck and military vehicle production. However, users of this high nickel carburizing series will be told, if they haven't already received notice,

INDUSTRIAL SHORTS

MORE COKE—The Koppers Co., Inc., Pittsburgh, has been awarded a contract by GENEVA STEEL CO. for 23 coke ovens at its Ironton plant near Provo. The Koppers-Becker ovens, gun flue type, will have a carbonizing capacity of 600 net tons of coal per day.

ADDS TO LINE — PRATT & WHITNEY, Division of Niles-Bement-Pond Co., West Hartford, Conn., will now handle the sales of Steinle centerless thread rolling machines of the Steinle Machine Co., New Britain, Conn.

MEETING DEMAND—Another manufacturing plant at 14 N. Bleaker St., Mount Vernon, N. Y., has been acquired by the PYROFERRIC CO. to meet the increased demands for its iron cores and powdered metallurgy development.

HEADS RESEARCH — Gordon W. Johnson, chief metallurgist at American Hoist & Derrick Co., St. Paul, has been named supervisor of foundry process research at Armour Research Foundation of ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago.

DOUBLY REWARDED — The Midland, Pa. plant of MACKINTOSH-HEMPHILL CO. has been awarded the safety trophy by the Metals Section of the National Safety Council and the annual award for industrial safety by the Steel Founders Society of America.

GROUP LEADERS—E. B. MacDonald, Syracuse Supply Co., Syracuse, N. Y., has been elected president of the AMERICAN MACHINE TOOL DISTRIBUTORS' ASSN. E. J. Seifreat, Seifreat-Elstad Machinery Co., Dayton, was named vice-president; John M. Riordan, Riordan Machinery Co., Detroit, second vice-president; and George B. McClennen, Delta Equipment Co., Philadelphia, secretary-treasurer.

TAKES OVER—Fred W. Wappat Inc., Maryville, N. Y., manufacturers of portable electric hand saws, has been purchased by CUMMINS PORTABLE TOOLS DIVISION., Chicago. The company will be operated by Cummins as the Fred W. Wappat Div. with the entire Wappat personnel being retained.

FREE DELIVERY—A service division has been set up by PRODUCTS ENGINEERING CO., Los Angeles, making it possible for their customers to receive free air express deliveries to any part of the United States on orders for A.S.A. standard jig drill bushings.

NEW ENTERPRISE — A new equipment manufacturers representative, the DORAC CORP., has been established at 62 LaSalle Road, West Hartford, Conn. They will also act as purchasing agents for their subsidiary company in Venezuela, Compania Anonima Venezolana De Importaciones Y Representaciones. Carlos A. Dominguez is president and Bruce L. Rackliffe, vice-president.

EXTENDS ACTIVITIES — The Power Ballaster Products Div. has been formed by PULLMAN-STANDARD CAR MFG. CO. with manufacturing facilities at Hammond, Ind. John A. Curtis will be manager of the new division.

GROWING — The Erie Iron Works at St. Thomas, Ont., has been purchased by ALLIS-CHALMERS RUNLY LTD., Canadian subsidiary of Allis-Chalmers Mfg. Co. Present plans call for the manufacture and assembly of products that will become component parts of finished equipment.

CHANGES NAME — To more closely associate its name with the firm's full scope of operations, the Warner Electric Brake Mfg. Co., Beloit, Wis., will now be known as the WARNER ELECTRIC BRAKE & CLUTCH CO.

they must use the 4600 series or preferably the 8600 series.

Makers of heat resistant castings are in even worse condition than are the steel mills. The common heat resisting grades used in all types of furnace equipment, etc., are shown in the table. Even the leanest of these chemistries is much higher in nickel content than that found in the standard constructional alloy steels. For this particular application, there is no substitute short of using alloys that are in even lesser supply than is nickel.

For some time the steel mills have been trying to allocate nickel-bearing steels on a just and realistic basis. Shipments of stainless steels for trim on appliances and automotive uses, plus the use of 18-8 for architectural purposes, is being restricted but the producers can't do it themselves. With the jet program demanding more and more stainless steels, the user of stainless for peacetime applications is on his way out into the cold and it looks as if he will stay out for some time because the industry expects the shortage to get worse.

Three weeks ago a large user of nickel had to pay \$1.00 a lb for immediate delivery of the 97 pct pure grade. A week later this consumer went back for more and was quoted a price of \$2.00 a lb.

Issue Aluminum Extrusion Manual

New York—A new manual of drafting standards for aluminum extrusions has been issued by the extruded products division of The Aluminum Assn. The manual outlines and attempts to standardize certain basic practices necessary to extruded products.

NLRB Plans Weirton Union Vote

Pittsburgh—Weirton Steel Co. workers will decide whether the United Steelworkers (CIO) or the Independent Steelworkers Union will represent them in collective bargaining in a National Labor Relations Board election slated for Oct. 24 and 26.

Rails' 100,000 Car Order Can Keep Plants Busy for Year

Denver—The 100,000 freight cars ordered by railroads in their drive to increase freight fleets from 1,728,000 to 1,850,000 cars are sufficient to keep all plants working at capacity for the next 12 months, said William T. Faricy, president of the Assn. of American Railroads, at the annual meeting of the National Assn. of Shippers Advisory Boards here.

Saying that new orders would supplement the 100,000 cars already on the books before delivery is completed, Mr. Faricy noted that rebuilding, repairing, and restoration to service of freight cars in August surpassed any month since October, 1939. Expansion of railroad shops and overtime are cutting down the number of cars needing repairs.

Progress in fulfilling transportation needs hinges on a continuing manpower supply and steel, needed for new cars and repairing the old, he continued. Efforts are being made to increase car utilization and the Shippers Advisory Boards are spurring their campaign for prompt, clean and complete unloading, he said.

Bruning Starts Teterboro Plant

New York—Preliminary excavations have been started for a new \$1 million plant at the Bergen County Industrial Terminal, Teterboro, N. J., according to Paul Bruning, chairman of the board of Charles Bruning Co., manufacturers of drafting equipment and engineering supplies. The air-conditioned, brick and steel structure will house the company's manufacturing operations, executive offices and laboratories.

Ohio Group to Meet Oct. 27-28

Columbus, Ohio—The Southern Ohio section of the national open-hearth committee, American Institute of Mining and Metallurgical Engineers will convene at the Deshler-Wallick Hotel here Oct. 27 and 28.

Westinghouse Uses 3-Coat Paint

Sharon, Pa.—Use of a three-coat "Coastal Finish" paint system has more than doubled the life of the finish on pole-type distribution transformers, according to Westinghouse Electric Corp. The finish is designed to withstand moisture and a wide range of temperatures. Each coat functions cooperatively to withstand oxygen, acids, salts and alkalis found in seacoast and industrial atmospheres. The paint is baked on in the mass production process.

Surface cleaning is obtained by treatment with phosphate solutions. The prime coat contains zinc chromate and iron oxide pigments in a vehicle of desired flexibility. Mica flakes in a vehicle of modified phenolic and alkyd resins make up the second coat. The final coat contains resins and pigments.



HOT RECEPTION: A coat of paint is baked on in a Westinghouse oven.

Metalworking Industry Offers \$94,322,000 Market for Rubber

New York—A broad \$94,322,000 market for mechanical rubber goods is provided by the metalworking industry, not including motor car and auto body fields, disclosed a survey conducted by the Market Research Div. of THE IRON AGE. Until this time no statistics were available to show the scope of this industrial market.

Questionnaires were mailed to 6000 diversified metalworking and metal-producing plants each employing 100 or more production employees. A 19 pct response was achieved when 1141 plants replied. It was a 13.6 pct slice of the total industry. The survey indicated that *only 38* of the 1141 plants queried did not use rubber either for plant or product.

Not all plants were able to supply dollar figures on annual purchases of mechanical rubber. However, 811 plants reported annual purchases of \$27,726,397. Expansion and detailed breakdown of rubber items and expen-

ditures led to the \$94,322,000 total. The majority of firms reported that their use of rubber is increasing.

Judgment Entered Against SKF

Washington—An antitrust consent judgment has been entered in the Philadelphia District Court against SKF Industries, Inc.

Charged with making cartel arrangements with foreign firms under which their competitive goods were not exported or imported, SKF must now adopt and promote a new trademark, sell bearings to all who order, cease referring orders or inquiries abroad, and develop independent outlets.

GE Opens Washington Office

Pittsfield, Mass.—General Electric Co.'s Chemical Dept. has opened a new sales office in Washington, D. C., to serve government needs. The office is located in the Shoreham Building, at 806 Fifteenth St., N.W.

Steel Sees Need of Clarifying NPA Orders

Task force in Washington plans to plug holes in leaky NPA dike . . . To consider strain on flat-rolled capacity, fair distribution of DO orders and tonnage left over.

New York—Steel producers generally feel that the present system of DO priorities won't work. Supporting regulations to clarify the situation are badly needed. Many decisions will have to be made.

The steel task force, the factor capable of salvaging NPA's project, is busy in Washington anticipating barriers to successful operation of the priority system. On its recommendation it is expected that subsequent NPA regulations will endeavor to plug up holes in orders that are, to put it kindly, obscure. Here are some of the problems being faced by the task force:

In the first place everyone feels the product mix of DO priorities will bear heavily on flat-rolled products such as plates and sheets (already in shortest supply). Since DO orders will have to be filled first, consumers of these items who do not have DO orders will be left out in the cold. Should the mills try to boost their production of these items and cut down on other items to help them out? Who is to make this decision, the mills or the government?

What's to Halt Rush?

What is to prevent holders of DO priorities from flocking to a few big mills to place their orders? Would the mills be forced to take these orders to the limit of their capacity? The mills don't want to book DO orders to capacity and see their competitors taking their customers without DO orders away from them.

Also, the mills ask what is to prevent holders of DO priorities from placing their orders with new suppliers and still keep getting their regular allotments from their regular sources of supply?

What if the government orders

some manufacturers of consumer goods to cut back production? The first thing they will stop buying will be their conversion and premium priced steel. This would leave them still on the mill books for their regular allotments and wouldn't do much to ease the pressure—unless real teeth were put into the inventory control order.

There will also be a terrific battle among consumers for the tonnage that is left after DO orders have been booked. How to distribute it fairly will be a headache.

Steel Warehouse Stocks Fall 40 Pct, Reports ASWA's Doxsey

Cleveland — Steel warehouse stocks have shrunk 40 pct in the past 12 months and high demand plus smaller shipments are hastening the inventory drop to threaten production of a multitude of small warehouse-dependent producers, said Walter S. Doxsey, president of the American Steel Warehouse Assn., Inc.

An ASWA survey shows an inventory loss since September '49 of 439,000 tons, a fall to a low 782,866 tons. A letter to Secretary of Commerce Sawyer stressed

the shortage by citing statistics from the American Iron and Steel Institute to show that 3,157,964 tons of steel, or about 14.24 pct of total mill output, went to warehouses in the first 6 months of 1950.

NPA's inventory control order can best be effected among all steel consumers by promptly replenishing and maintaining stocks of warehouses to offset the necessity of building up abnormal inventories by the armed forces and other users, said Mr. Doxsey.

Form Soft Coal Committee

Washington—A soft coal industry committee was formed last week with duties of insuring sufficient coal supplies by providing rail transportation, machinery and supplies. Headed by William H. Cooke, Little Sister Coal Corp. president, the committee will also plan to counteract the manpower drain of selective service. The group will cooperate with government agencies in the defense program. John L. Lewis, president of the United Mine Workers, did not comment.

Romos Buys Horton Mfg. Co.

Cincinnati—The Horton Mfg. Co., Fort Wayne, Ind., was bought by Romos Enterprises, an investment corporation of this city, reported A. E. Askerberg, president of Horton, manufacturer of home washing machines, driers, and ironers. The Horton plant has 110,000 sq ft of manufacturing space and asset value of the firm's common and preferred stock on Aug. 31 was \$1,488,157.

Texas Pipe Foundry Completed

Lone Star, Tex.—A \$1.5 million cast iron pipe foundry completed at the East Texas plant of the Lone Star Steel Co. will have an annual output of 80,000 tons of pressure pipe. The new plant will give Lone Star another outlet for production of high grade pig iron. W. C. Fearn is plant superintendent.

Scrap Out of Brooklyn

New York—Six thousand tons of scrap steel will be plucked out of Brooklyn air when razing of the 65-year-old Lexington Ave. elevated line commences on Nov. 1. It was decided to abolish the rickety structure for economy reasons. George H. Nutman, Inc., Jamaica, Queens, will pay New York City \$51,760 to tear down the "el" and cart away salvaged materials.

NPA to Put Controls into Slow First Gear

Plans to speed up two parts of DO program: even distribution of orders among mills, set lead time for producers . . . First allocation of freight car steel expected.

Washington—The creaky machinery of government controls gathered a little speed this week.

But there still was no indication from the White House of any inclination to notch the program up to top speed before the November elections.

With regulations of inventories already off to a faltering start, the National Production Authority is now preparing to throw its first formal allocation program into gear, and to apply oil to two slow-moving parts of the DO priority program.

Knudson Is Ready

Official announcement by NPA Administrator Harrison of orders to carry out these moves is expected to result in:

- (1) The first allocations of steel for new freight cars.
- (2) Even distribution of DO orders among the nation's steel mills.
- (3) Establishing of a "lead time" period for producers.

The freight-car allocation program, which may result in construction of 10,000 cars a month if shops can get materials, is slated for administration by Interstate Commerce Commissioner Knudson. And instructions governing distribution of DO orders and setting up of a "lead time" period will be carried out by amendment of NPA's basic priority order—NPA Regulation 2.

As far as the freight-car program is concerned, ICC Commissioner Knudson has been itching for weeks to start things rolling. He has a "ready-made" program, he told Mr. Harrison last week in putting in his bid for allocation authority.

"It is the only vital aspect of the defense program that is fully ready to go—today," he declared. He described current car short-

ages as "in the neighborhood of 40,000 daily."

Mr. Harrison, meanwhile, continues to move slowly in naming industry advisory committees to NPA. Automobile manufacturers, for example, see no hope that their committee may be formed before the middle of November.

Military Stays Mum

Mr. Harrison blames the delay on the reluctance of the military in saying how much steel will be needed for defense production. Some unofficial reports from the Pentagon have placed the military's required share of total steel output at about 20 pct—a figure far in excess of anything contemplated only a month ago. Copper, aluminum, and brass were mentioned by Mr. Harrison last week as commodities earmarked for control "in a month or two."

The Army, for example, disclosed early this week that it had entered into contracts with Cadillac for an undisclosed number of light tanks; with Continental Motors for engines for light and medium tanks; American Car & Foundry, 105-mm howitzer motor

carriages; International Harvester, armored utility vehicles; and with Pacific Car & Foundry for 155-mm gun motor carriages. Contracting officers of the Army, Navy, and Air Force were authorized last week to assign DO ratings to the contracts they issue. This means that all outstanding contracts now in effect and all new contracts will be rated DO, with the exception of construction equipment for domestic use, post exchange items, and like non-defense products. Similarly, the Atomic Energy Commission directed its nine operations offices to issue the priority ratings for all orders connected with AEC operation or construction.

FMA Plans Dry Cargo Ships

Washington—The vital need for dry cargo vessels in quantity is about to be met by the Federal Maritime Administration.

Invitations to bid on preparation of specifications and plans for a 20-knot National Defense type cargo ship have been issued to shipbuilding companies and designers. The new vessel will be about 525 ft long with more than 12,000 deadweight tons capacity, enabling it to carry two and one-half times the cargo per year as the World War II Liberty ship. The National Defense type ship will make 20 knots, compared with the 10-knot speed of the Liberty. Its plans call for interchangeability of parts. The question of how many such vessels will be built has not yet been determined.

B & O Orders 90 Diesels

Baltimore — Under a leasing agreement with the Equitable Life Assurance Society, the Baltimore and Ohio Railroad will get 90 diesel-electric locomotive units costing about \$14,848,168. The 86 freight units and four passenger units of 1500 hp and 2250 hp, respectively, will increase the B&O fleet by 22 pct. General Motors' Electro-Motive Div. will deliver the passenger units within weeks and the freights by mid-1951.



"I've got an enviable record, Smythe. So far I've complied with every suggestion dropped in this box."

Construction Needs 2 Million Tons of Steel for Final Quarter

Industry on way to biggest dollar volume year despite shortages.

Washington—The construction industry is headed for its greatest dollar volume despite shortages and its latest bogey, priorities and controls. The figure is expected to reach \$26 billion exclusive of an additional \$8 billion in maintenance.

The industry will need nearly 2 million tons of finished steel products during the last quarter—or about 13 pct of the probable output of finished steel.

There have been increasing reports of steel and other materials shortages in recent months. A check shows that the construction industry has been getting its proportionate share of increased steel production in 1950.

Gets 7.5 Million Tons

Last year, out of total shipments of about 58.1 million tons of finished steel, the building industry got nearly 7.5 million tons. Through the first half of 1950, finished steel shipments totaled 34.5 million tons, of which more than 4 million went to the construction industry.

Nevertheless, builders are quick to note that percentage-wise the increased tonnages of building materials has not kept pace with the 26 pct increase in building volume. A new worry is how deeply credit control, inventory control, and priorities will bite into the available supply.

New construction activity for the first 9 months of 1950 amounted to \$20.1 billion, according to Commerce and Labor Dept. reports. This is about \$2 billion less than the revised total of \$22.1 billion for all 1949.

Industrial construction paced the building activity in September. Total new construction for the month was nearly \$2.8 billion, with the following fields showing strong gains over September: industrial, from \$90 million to \$101 million; commercial, including stores and warehouses, from \$113

WHAT MAKES AN AUTO

Pounds of Material Required For a 1950 4-Door Sedan

	Total Requirements (3824 lb car) per 1000 lb*	Approximate Requirements (lb)
Steel, Net	2556	669
Steel, Gross	3320 (1)*	870
Gray Iron, Net	521	136
Gray Iron, Gross	641 (2)*	168
Malleable Iron, Net	99.6	26.0
Malleable Iron, Gross	122.5 (2)*	32.1
Aluminum and Alloys	11.4 (3)	2.98 (3)
Copper	26.0	6.8
Copper Alloys	15.6	4.08
Lead and Alloys	30.4	7.95
Zinc and Alloys	66.1	17.3
Antimony	1.1	.29
Manganese	18.8	4.9
Silicon	17.3	4.52
Chromium, Molybdenum and Nickel	7.2 (3)	1.88 (3)
Tin	1.37	.36
Fabric	92.3	24.2
Glass	76.3	20.0
Rubber Compounds	205.6	53.6
Plastics	5.2 (3)	1.36 (3)

(1) Based on an estimated 30 pct scrap loss, believed to be a conservative estimate. Scrap losses on bodies as high as 39 pct have been reported.

(2) Based on a 23 pct scrap loss.

(3) These figures vary over a wide range according to the manufacturer's specifications.

* Data not included in McCuen's paper.

million to \$120 million; and residential, from \$1,286 million to \$1,294 million.

Private financing provided 75 pct of the construction for the first 9 months—about \$15 billion. Publicly financed work accounted for \$5 billion, up about 8 pct from last year.

Chicago Plant Investments Rise

Chicago—Plans for investment of \$21,563,000 in industrial facilities in the Midwest area were reported by 41 companies during September, according to the Chicago Assn. of Commerce and Industry. Investments for the first 9 months of 1950 totaled \$272,609,000 compared with \$81,913,000 for the corresponding period last year.

FPC Approves N. Y. Gas Line

Washington — The Federal Power Commission has authorized the New York State Natural Gas Corp. to construct 44.5 miles of 16 and 18-in. pipeline to connect Leidy gas field with the company's transmission system in Pennsylvania. Cost is estimated at more than \$1.5 million.

GM Research Head Reports Unsolved Auto Chemistry Needs

Includes higher octane fuels, alloys, adhesives, new finishes.

Detroit—Chemists and metallurgists have a lot of unfinished business with the automobile industry, C. L. McCuen, general manager of General Motors Research Laboratories, told Commercial Chemical Development Assn. and the Chemical Market Research Assn. last week in Washington.

All Fields of Chemistry

Listing 256 chemical products used directly or indirectly by the automobile industry, Mr. McCuen showed that metals—steel, iron, copper, lead, zinc, manganese and other elements—account for as much as 88 pct of the finished weight of a motor car. (See accompanying table at left.)

He showed that the auto industry's unsolved chemical problems embrace practically every phase of chemistry and pointed out specific unsolved metallurgical problems including heat-resistant and wear-resistant alloys, corrosion, electroplating, substitute materials and raw materials. When availability of high octane fuels permit use of high compression engines at 12.5 to 1 ratio, three oil wells will serve for four, Mr. McCuen said. He promised a gallon-per-day saving with higher compression engines.

The industry's most important unsolved chemical problem is the production of large quantities of high octane fuels at a low price, he said.

New Finishing Method

Mr. McCuen reported a synthetic adhesive that withstood 10,000 psi in tension and suggested that durable adhesives may some day be used for many auto parts that are being mechanically fastened. The chemist must continue to develop better metal cleaners, corrosion preventatives.

A recent finishing method shows much promise, McCuen said, in which a diluent with a lower boil-

ing point than the solvent is used so that it evaporates between the time the lacquer leaves the spray gun and the time it hits the surface being painted. The solvent has a higher boiling point material so that in drying the lacquer film will flow slightly, reducing roughness or "orange peel".

McCuen reported that GM has saved \$50,000 per year in one plant by adding starch to compounds used in circulating water

in spray booths to stop clogging.

The auto industry needs a finish in all colors that can be applied in one coat, directly to the metal, and give a permanent lustrous finish without buffing. Auto producers also want bright plating which requires no buffing. The GM Research head said that electro deposit of metal, used today for tire molds, may be a future plating development of considerable interest to the industry.

Austria; France, Sweden, Poland, and even Turkey, which offered one steel company 20,000 tons. Generally, quality of the foreign iron ore is good, although some of it has been high in silicon.

Ore from Sweden

Carnegie-Illinois is rebuilding its No. 3 furnace at Isabella Furnaces, Etna, Pa., idle for more than a year, with intent to produce ferromanganese and thus make possible the production of pig iron at one of the company's Monongahela Valley furnaces. Under normal conditions the company would not consider rebuilding the Etna furnace, which is an obsolete operation. It is expected that the furnace will be producing by the end of this year.

These moves by the producers are in the nature of "insurance" that capacity production of steel will be possible should the pinch grow tighter during the winter.

U. S. Steel Corp. does not fear an iron ore shortage. However, it is hoping to be able to move 1,500,000 tons of ore all-rail before winter closes in, and it is also realizing an increase in the tonnage being moved on the Lakes. The company now is requiring 750 freight cars per day for iron ore movement. U. S. Steel also is importing high-grade ore from Sweden for use in its Tennessee operations. The high quality of this

Anxious Steel Pushes Raw Materials Drive

**Industry scrambles to insure continued high production . . .
Fear iron ore squeeze, delivery spurred . . . Fierce competition in pig iron . . . Coke needs high**—By John Delaney.

Pittsburgh—Steel producers are concerned about iron ore, pig iron, and coke. This is reflected in the scramble for foreign pig iron, all-rail shipments of iron ore, and industry efforts to produce every possible pound of coke.

At least one steel company executive fears that lack of iron ore will force some mills to cut back operations by April. While others believe this is a pessimistic extreme, they agree that without a lot of breaks it's going to be a tight squeeze.

Competition for foreign pig iron has boosted the delivered price beyond current domestic levels, whereas earlier this year it was just the opposite. A local blast furnace operator said that foreign prices are now "all over the lot." A district mill that had imported 15,000 tons from Germany said that the delivered price was \$47.00, but that latest offerings were \$17.00 higher.

Press Freight Reduction

Carnegie - Illinois Steel Corp. has contracted for 100,000 tons of German iron. The company is now pressing the railroads for a reduction of the freight rate from Baltimore and Norfolk to Pittsburgh, arguing that it can ship by barge from New Orleans cheaper. The general traffic com-

mittee of the eastern railroads has recommended one reduction in this rate—for example, that the Baltimore-Pittsburgh rate be reduced from \$8.18 per gross ton to \$7.50 on 100,000 lb minimum shipments—and is considering a further cut.

Besides Carnegie-Illinois, companies that have imported foreign iron ore are considering such a move include Sharon Steel Corp., Portsmouth Steel, Shenango Furnace Co., Detroit Steel Co., Vulcan Mold, and Westinghouse Airbrake Co. Foreign sources include the Ruhr Valley, Germany; Linz,

STEEL IGLOO: At Bethlehem Steel's Steelton, Pa., plant, this spherical head is temporarily check-assembled in the fabricating shop. It is constructed of steel plates 41 in. thick and will become part of a capsule-shaped gas holder 205 ft long. The Argentine government has ordered ten of the holders.



ore enables increased iron production with less coke consumption. Pittsburgh Steel Co. also is moving considerable tonnages of ore from Minnesota and other points by rail to continue in production a third blast furnace at its Monessen, Pa., works. Even off-grade ore is being used by at least one producer.

Demand for coke is straining the productive capacity of the industry. U. S. Steel has about 2800 beehive ovens in operation or under contract. Chances are that more beehives will be brought into production. The number in use is still below the 4800 wartime peak of the corporation, however.

Norway to Get Machine Tools

Washington—Norway has been authorized to spend \$2,354,000 for American-made machine tools with Marshall Plan funds under the military aid program. Delivery is to be completed by June 30, 1951.

The Norwegians have also been authorized to buy \$372,000 worth of copper and copper products under the same program, bringing ECA's total participation in the pact to date to \$21 million.

NAEC to Mobilize Independents

Detroit—The National Assn. of Engineering Companies will meet here within 60 days to mobilize independent engineering companies and classify several engineering services to indicate specialized ones available from the hundreds of independents. Harry L. Murray, of Murray Engineering Co., Detroit, is president.

Interested in Buying Lustron

Pittsburgh—Westinghouse Electric Corp. is interested in buying the bankrupt Lustron Corp., Columbus, Ohio, according to a company spokesman who added that the plant would be converted to war production. The Reconstruction Finance Corp., its prime creditor, bought Lustron for \$6 million in a bankruptcy sale.

Manufacturers' Agents Assn. Asks for Square Deal in Bidding

MANA's Wilcox attacks GSA form . . . Tax court okays 5-percenter use.

New York—While the Manufacturers' Agents National Assn., Alhambra, Calif., asked for a "square shake for the little fellow" by having the government distinguish between the "fly-by-night" 5-percenter and the established manufacturer's agent, the General Services Administration and the U. S. Tax Court, Washington, had a difference of opinion on the status of the 5-percenter.

MANA protested against the new form of invitations-for-bid being considered by the General Services Administration, policy formulator for civilian Federal purchasing agencies. In a statement, MANA president E. A. Wilcox said that, although the new form was intended to discourage the 5-percenter by promising extensive investigations of persons aiding manufacturers in securing contracts, it would in effect dis-

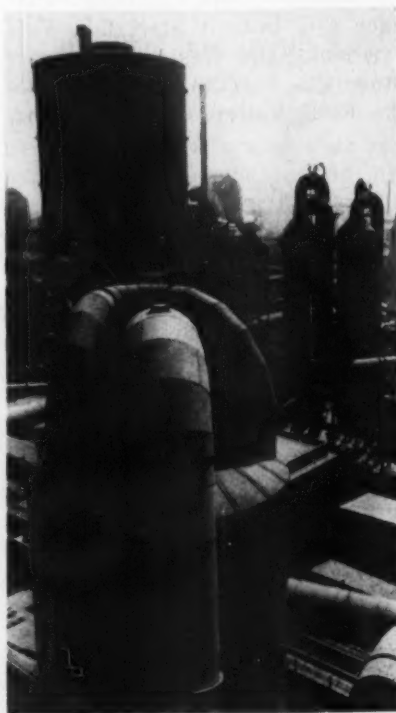
courage small manufacturers who must sell through agents.

The U. S. Tax Court put itself on the other side of the fence last week by conditionally upholding the use of 5-percenters to get defense contracts if they had not wielded "undue influence". The court held that \$59,496 deducted by the Aetna-Standard Engineering Co., Youngstown, Ohio, from income taxes as commissions for contract-getting should be allowed.

Bid on Equal Terms

Mr. Wilcox, of MANA, said that suppliers should be allowed to bid for contracts on equal terms, regardless of whether or not they do or do not employ agents. He indicated that the GSA form would inconvenience manufacturers. Some reports are circulating that government procurement agencies discourage bidding by small firms. The policy on defense contracts has been to load major producers with them as the quickest method of opening production. A subcontract sift-down would go to smaller producers.

CALCUTTA STEEL MILL: Practically all of India's steel is produced in the Tata-nagar steel works on the outskirts of Calcutta. Last year the mill produced 850,000 tons of steel.



Spray 10 Tons of Zinc on Span

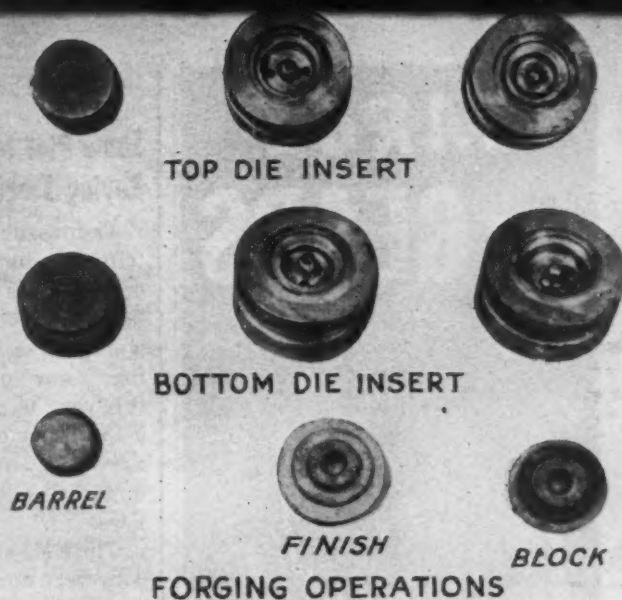
Chicago—Ten tons of zinc were sprayed on the underside of the Southwest Traffic Viaduct in Kansas City recently in one of the largest metallizing jobs ever undertaken, according to Metallizing, Inc. The zinc coating, minimum thickness 0.012 in., will eliminate the need for frequent repainting of the 140 ft span situated in a heavy industrial atmosphere and subject to sulfur corrosion caused by train smoke.

Armco Adds to Zanesville Plant

Pittsburgh—Chemical Plants Div. of Blaw-Knox Co. has received a contract from Armco Steel Corp. for construction of additions to the hot mill and annealing buildings at Armco's Zanesville, Ohio, plant. The hot mill addition will be 100 x 260 ft, and the annealing building addition 87 x 108 ft, both one-story.

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LIBERTY at 25th PITTSBURGH 22, PA.

Some PMI Members Report Buying Steel at Premium Prices

Tadoussac, Quebec—Steel distribution has some flaws when 30 pct of firms surveyed report buying 75 pct of their steel from warehouses and 40 pct report buying some premium priced steel this year in amounts ranging from 5 to 90 pct of their purchases, declared a survey of the Pressed Metals Institute at its convention here.

The PMI survey stated that members were now securing 50 pct more steel than in 1940 but that a number of individual cases were reported in which steel was bought at from \$300 to \$380 per ton. PMI said that the steel industry "is getting some unwarranted blame for the amount of steel finding its way into the gray market" despite strict policing measures.

The survey claimed that, if statistics reported by members were correct, 800,000 tons more steel sheet and strip would be enough to alleviate extremely tight market conditions.

Officers elected include: Howard C. Wolf, Mullins Mfg. Co., president; Thomas L. Baker, National Stamping Co., vice-president; and Hunter Morrison, Jr., Morrison Products, Inc., secretary-treasurer.

Asks Aid in Gray Market Fight

St. Louis, Mo. — Cooperation from consumers in breaking up reported gray market operations in oil country tubular products was sought by Henry J. Wallace, vice-president in charge of sales, National Tube Co., in a talk before the Independent Petroleum Assn. of America.

Tubular goods supplies for the estimated 43,000 oil wells to be drilled in 1950 will be met if all sources are used, he said. About 1,569,000 tons of tubular products are available for the U. S. market and requirements for 1951 will be met on substantially the same level if military and essential civilian requirements do not exceed the present program of 12 pct of steel capacity.

Integrated Die Casting Plant Expanded by Doehler-Jarvis Corp.

Toledo—One of the most modern and progressively arranged die casting plants has been set up in the past 2 years by the Doehler-Jarvis Corp. If completed late this year, the new plant will house alloying, casting, finishing and shipping operations under one roof.

The original 13-acre tract on Dixie Highway has already been expanded to 26 acres. The finished plant will have more than 200,000 sq ft of floor space and will cost \$3.5 million. It was designed to accommodate the ever-increasing size of die castings and is currently producing more than 600 finished auto grilles for the 1951 Packard.

Inland Fights Gray Market

Chicago—Joseph L. Block, sales vice-president of Inland Steel Co., recently sent a letter to their customers asking them to report any gray market "deals" offered them, in which steel said to be coming from Inland, is mentioned.

"All such stories are completely false," Block said, "and the individuals making such propositions are either charlatans or dupes."

He said that such information would be passed on to government authorities. The announced policy of the company is to discontinue sales to those companies which purchase steel for resale.

Power Planning Lowers Costs

Newark, N. J.—Planned power to keep industrial wiring systems abreast of rapidly changing plant power requirements will help raise production and lower costs, J. L. Wagoner demonstrated at a Planned Power Distribution meeting sponsored by Westinghouse.

Bus duct for flexible, accessible distribution of power, capacitors to get maximum work from the power supplied, and circuit breakers for safe, tamper-proof protection will aid in modernizing industrial wiring systems, it was shown.

Some Steelworkers Decline Retirement at 65

As many as 40 pct eligible for pensions stay on job . . . Trend may cut firms' pension fund liability . . . Increasing Social Security will lower contributions—By Gene Beaudet.

Chicago—With the high cost of living and a wage increase for steelworkers a probability, a number of steel company employees in the Chicago area are not taking advantage of retirement benefits under pension plans. In some companies as many as 40 pct of those eligible for retirement at 65 are staying on the job.

Pension Liability Down?

If the keep-working trend continues a company's liability in a pension fund will be reduced because the employees will be paid retirement benefits for a shorter length of time. To what extent this will affect a steel company's liability is a little too early to determine because of the short time the non-contributory pension has been in effect.

However, it is expected that adjustments will be made as soon as actuaries have enough figures available to predict what percentage of the employees will retire at 65 and how long those who don't retire will continue to work. One steel company is now taking a survey of workers of retirement age to determine why some do not wish to retire. Because some workers just are unable or don't care to live on pensions will probably be the most common reason.

Increased social security benefits will also reduce the steel companies' liability in a pension trust where the total amount of a worker's pension is fixed at a certain level, dependent on his length of service. In such cases the difference between this figure and the amount of social security is paid by the company. Therefore, as social security increases, the amount the company contributes decreases.

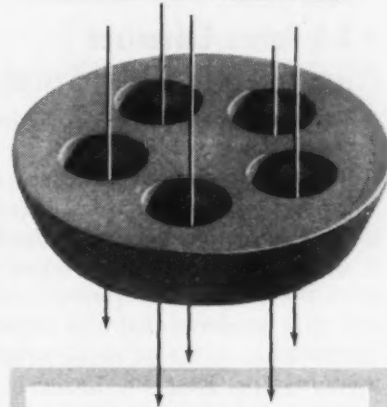
Steel company officials point out, however, that the increase in social security benefits was anticipated by both the steel companies and the steel workers union when the pension contracts were drawn up. The company's liability in a pension trust was determined on the basis of increased social security.

Regardless of the reason, it is expected that the unions will make increased pension benefits a part of their future demands. They will argue that the steel companies' liability in a pension plan should increase with the cost of living.

Art Metal to Build New Office

Buffalo—The Art Metal Construction Co. of this city will build a new office building costing in excess of \$500,000.

CERAMIC STRAINED METAL IS CLEANER



ALSiMAG®
Ceramic
STRAINER CORES
MEAN
CLEANER CASTINGS
—FEWER REJECTS

Don't be satisfied with your foundry operation until you have tried ALSiMag Strainer Cores. They strain the incoming metal and regulate its flow—thus greatly reducing the possibility of sand in the casting. Check these features:

1. Little abrasion from metal stream
2. Allow positive even flow of metal
3. Even thermal expansion
4. Withstand all normal pouring temperatures
5. Tough, easy to use on fast production

ALSiMAG CUT-OFF CORES

Used in neck of riser to form weak joint between riser and casting. Riser can be knocked off in one easy operation. Eliminates cut-off time.

ALSiMAG GATE TUBES

Keep gate sand from getting into casting. These tubes form a smooth ceramic liner for metal to pass through. Give cleaner castings.

TEST THESE PRODUCTS IN YOUR OWN FOUNDRY: Samples of products mentioned above and other ALSiMag ceramics are available in stock sizes free on request. Samples to your own specifications will be made at minimum cost. Write today.

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FOR CLOSE QUARTERS: This special Crosley ambulance can speed to any part of Westinghouse Electric Corp.'s Transformer Div. plant, Sharon, Pa.—a trip that its bulkier brothers could not make. On call 24 hours a day, the indoor ambulance is another safety innovation for this plant.



J & L Raises Galvanized Prices with New Sliding System

Zinc climb prompts rise . . . System to reflect zinc cost fluctuation.

Pittsburgh—Increased cost of zinc and the possibility of still further advances has persuaded Jones & Laughlin Steel Corp. to adopt a pricing system for galvanized pipe and wire products that will reflect fluctuations in the price of prime western zinc, East St. Louis.

The new system went into effect with shipments of Oct. 4, at which time prices were adjusted to reflect 17.5¢ zinc. Hereafter, the last quotation of the week on East St. Louis zinc will govern the price on shipments of affected products in the succeeding week.

Zinc Costs Rise

The company emphasized that the changes are a reflection only of the increased cost of galvanizing due

to advances in the price of zinc. There was no change in the steel price.

A J. & L. executive said the company felt that a sliding scale of pricing tied in with the price of zinc was urgently needed at this time because the world price of zinc is now approximately 25¢ per lb and the domestic price may reach that level because of strong demand and government stockpiling.

To Reflect Zinc Trend

The price adjustments will work both ways but downward changes will stop if and when zinc drops to 10¢ per lb. The company considers this a leveling-off point.

Immediate adjustments included price advances of \$3.00 to \$10.00 on galvanized pipe; increases of \$4.00 per ton for galvanized staples, barbed wire, and fencing; increases of \$4.00 per ton for galvanized wire in commercial coatings and \$7.00

J & L Galvanized Discounts

Pittsburgh—On the basis of 17.5¢ zinc, Jones & Laughlin Steel Corp. galvanized price discounts are as follows:

Standard, T & C—Butt weld—1/2-in. 18 1/2; 3/4-in. 21 1/2; 1-in. 24; 1 1/4-in. 25; 1 1/2-in. 25 1/2; 2-in. 26; 2 1/2-in. 27. Lap weld—2-in. 14 1/2; 2 1/2-in. 21; 3-in. 21; 3 1/2 & 4-in. 22. Seamless—2-in. 14 1/2; 2 1/2-in. 18; 3 1/2-in. 20; 4-in. 21; 10-in. 20 1/2; 12-in. 19 1/2.

Extra Strong, Plain Ends—Butt weld—1/2-in. 17 1/2; 3/4-in. 21 1/2; 1-in. 23 1/2; 1 1/4-in. 24 1/2; 1 1/2-in. 25; 2-in. 25 1/2; 2 1/2-in. 26 1/2; 3-in. 26 1/2. Lap weld—2-in. 15 1/2; 2 1/2 & 3-in. 21; 3 1/2 & 4-in. 23 1/2. Seamless—2-in. 14 1/2; 2 1/2 & 3-in. 18; 3 1/2-in. 20.

New column product listings are:
Galvanized staples—110
Galvanized barbed wire—130
Galvanized fence—120

per ton for heavier coatings (type 3 and heavier); and advances of 70¢ per 100 lb in galvanized nail extras.

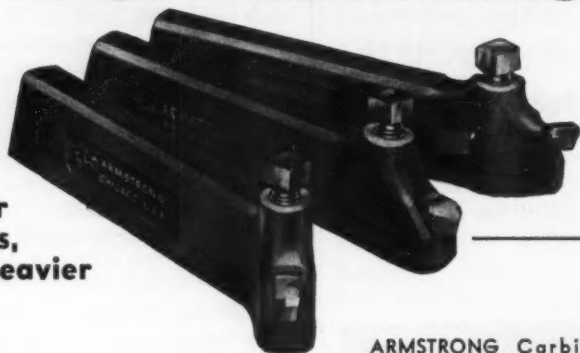
Under the new system, galvanized nail extras will advance or decline 5¢ per 100 lb with each change of 1/2¢ in the price of zinc. For example, if zinc drops to 17¢, the extras will decline 5¢ per 100 lb, while an increase to 18¢ will mean an advance of 5¢ per 100 lb. Galvanized nail extras, adjusted upward 70¢ per 100 lb to reflect 17.5¢ zinc, are now \$3.15 for 15 gage and coarser, and \$3.65 for finer than 15 gage.

More Zinc for Smaller Sizes

For each change of 1¢ in the price of zinc, galvanized pipe prices will advance or decrease \$2.00 per net ton or 1 discount point on 1/2-in., 3/4-in., and 1-in. sizes; \$1.50 or 3/4 point on 1 1/4-in., 1 1/2-in., and 2-in. sizes, and \$1.00 or 1/2 point on sizes over 2 in. It was explained that the smaller sizes require more zinc coating since the surface to be covered per ton is greater.

On other galvanized wire products prices will fluctuate up or down 5¢ per 100 lb or 1 column with each 2¢ change in the zinc price. For example, galvanized barbed wire has been adjusted upward to column 130 to reflect 17.5¢ zinc. This price will not advance to column 131 unless zinc rises to 18¢ per lb, and it will not decline to column 129 unless zinc drops below 16¢.

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Speeds,
and Heavier
Feeds

ARMSTRONG Carbide Tool Holders and ARMIDE (Carbide

Tipped) Cutters come in cased sets for tool rooms and maintenance departments, and individually in all sizes for general machine shop and production turning. They permit not only the ready machining of sand-filled castings, the hardest and toughest steels as well as many heretofore "unmachineable" materials, but also make practical much heavier cuts and cutting speeds up to 600 f.p.m. on ordinary work. They also run from 10 to 100 times as long between regrindings.

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Will Climbing Costs, Wages Force Steel Up?

Prices of materials, services bound upwards while steel holds price line . . . Ore more expensive . . . Pending wage boost for USW will bring added pressure . . . Pig iron also up.

Pittsburgh — Steel consumers are evaluating the pro's and con's of the possibility of a rise in steel producers' prices. They are paying specific attention to two impressive arguments from the "yes" platform. A growing list of materials and services have been sky-larking upward in price while steel prices remain unchanged since last December. The wage increase to be granted to the United Steelworkers of America (CIO) is imminent—and the USW is likely to ask for a substantial boost.

Sharon Steel Corp. and Granite City Steel Co. raised prices recently. (THE IRON AGE, Oct. 5, 1950, p. 125.)

Concerted Upward Trend

Mills are paying more for most products. From June 15 to mid-August, the price of copper advanced 9 pct, lead 17 pct, nickel 20 pct, tin 35 pct, palm oil 10 pct, fire clay 8 pct, fluxing lime 5 pct, electrical equipment as high as 27 pct, fuel oil 5 pct, finished lumber 15 pct, and mill supplies 10 pct.

Tungsten advanced from \$2.25 to \$2.50 per lb. Oct. 1; tungsten powder from \$2.90 to \$3.25 per lb. Sept. 1 and to \$3.40 Oct. 1; ferro molybdenum from \$1.10 to \$1.13 per lb. last January; ferro columbium from \$2.93 to \$3.53 per lb. April 1; graphite electrodes increased \$10 to \$20 per net ton June 21, depending on size; grinding wheels advanced 10 pct last spring.

Last January No. 1 heavy melting steel scrap at Pittsburgh brought \$30 per ton. Today the price is \$44—an advance of 47 pct. In the interim the price as quoted by THE IRON AGE reached a high of \$47. Higher prices have been paid and are now being paid under conversion arrangements. Stainless steel scrap has increased at least 50 pct.

Pig iron prices are up \$3 per ton. Advances by the Valley producers—Shenango Furnace Co. and Youngstown Sheet & Tube Co.—mean an automatic increase in the price of ingot molds. Freight charges have also gone up. So have Social Security and income taxes.

Alcoa's 10 Pct is Floor

Phil Murray, union president, is not thinking in terms of "cost of living" increases for his members, although this will be a mainstay in back of his demands. Under pressure to do so, he talks of im-

proving the purchasing power of his members. The steel workers have not had a wage boost since 1948.

Producers are paying for iron ore losses due to last fall's strike in the ore fields and the late start of the ore season this spring. A number of them, notably U. S. Steel Corp., and Pittsburgh Steel Co., are shipping ore all rail. The Corporation hopes to move 1,500,000 tons in this manner before cold weather calls a halt. This makes for expensive ore.

Scrap Dealers Discuss Manpower

Pittsburgh—The yard dealers and balers committees of the Institute of Scrap Iron & Steel, Inc., met here recently to consider the industry's manpower problems as related to defense.

For Use In:

FOUNDRY

COKE DEPT.

STRIP MILL

STORES DEPT.

TOOL WORKS

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SCRAP YARDS

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KRANE KAR swings load to either side

KRANE KAR is a lively swing-boom mobile crane, gas or diesel operated, of compact dimensions, short turning radius. It transports any load it can lift. Put it to work in any part of your plant, yard, or stores; it will speed up production, cut down handling costs. Available for service 24 hours a day, every day.

9 to 37 ft. booms or adjustable telescopic booms. Electric magnet, clam-shell bucket, and other accessories available. Write for Bulletin No. 79.

THE ORIGINAL SWING-BOOM MOBILE CRANE
WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER
1½, 2½, 5, AND 10 TON CAPACITIES

KRANE KAR
TRADE MARK REGISTERED

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Winches, Truck Cranes, etc.

SILENT HOIST & CRANE CO., 851 63rd ST., BROOKLYN 20, N.Y.



STEEL CONSTRUCTION NEWS

Fabricated steel awards this week included the following:

- 1600 Tons, Acton, Boxboro, Littleton and Acton, Mass., new road and bridges through Gil Wyner, Malden, Mass., to West End Iron Works, Cambridge, Mass.
- 846 Tons, Danvers, Middleton, Topsfield and Boxford, Mass., bituminous concrete and nine bridges. Savin Construction Co., Hartford, Conn., awarded contract.
- 670 Tons, Pennsylvania Dept. of Highways, Highway bridge, LR 147, Berks County, to Bethlehem Steel Corp., Bethlehem, Pa.
- 620 Tons, 3 and 6 story apt. project, Flushing, N. Y., to Grand Iron Works.
- 400 Tons, Building for Sprout Waldon Co., Muncie, Pa., to Bethlehem Steel Corp., Bethlehem, Pa.

- 400 Tons, Upper Darby High School, Upper Darby, Pa., to Lehigh Structural Steel Co., Allentown, Pa.
- 375 Tons, Group of buildings, Mary Wood College, Scranton, Pa., to Pinebrook Iron Works, Scranton.
- 345 Tons, Derby and Ansonia, Conn., two span continuous welded girder bridge and simple span rolled beam bridge on Shelton Derby Ansonia Expressway. E. T. Nettleton, New Haven, Conn., district engineer. Mariani Construction Co., New Haven, Conn., low bidder.
- 250 Tons, Engineering building, Pennsylvania State College, State College, Pa., to Anthracite Bridge Co.
- 205 Tons, Arcadia Parish, Louisiana, bridge, Louisiana State Highway department, to Virginia Bridge Company, Birmingham, Ala.
- 160 Tons, Fairfield, Ala., soaking pit, Ansler-Morton Corporation, to Virginia Bridge Company, Birmingham, Ala.

Fabricated steel inquiries this week included the following:

- 430 Tons, Pennsylvania Dept. of Highways, highway river bridge, LR 180, Delaware County, bids due Oct. 27.
- 360 Tons, Pennsylvania Dept. of Highways, I-beam highway bridge, LR 770-1, Cumberland County, bids due Nov. 10.
- 350 Tons, New Jersey Dept. of Highways, highway bridge, Route 151, Camden County, bids due Oct. 17.
- 128 Tons, Pennsylvania Dept. of Highways, Morrisville approach to Delaware River bridge, Trenton, New Jersey, bids due Nov. 2.

Reinforcing bar awards this week included the following:

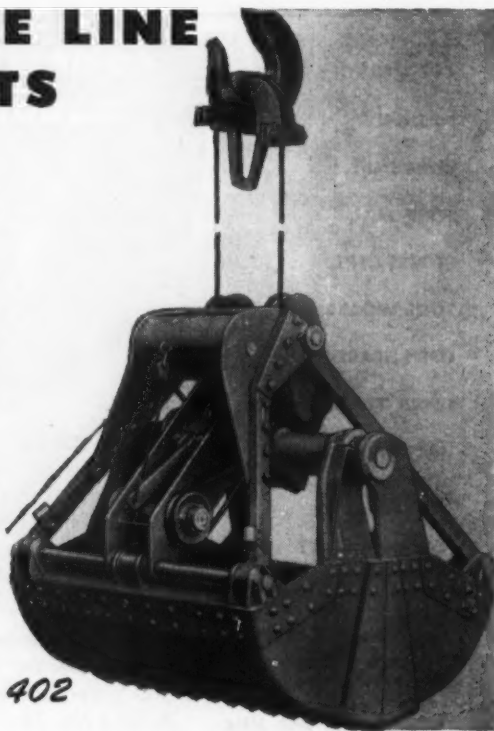
- 1000 Tons, Dayton, Miami Valley Hospital, to Truscon Steel Co.
- 942 Tons, Chicago, National Biscuit Co., bakery, Ragnar Benson, Inc., contractors, to Joseph T. Ryerson and Sons, Chicago.
- 700 Tons, Chicago, apt. building on Sheridan Rd., to U. S. Steel Supply Co., Chicago.
- 565 Tons, Allegheny County, Pa., paving to Lind Steel Co.
- 500 Tons, Ramp garage, Miners' National Bank, Wilkes-Barre, Pa., Sordoni Construction Co., Wilkes-Barre, general contractors, to Bethlehem Steel Corp., Bethlehem, Pa.
- 500 Tons, Department store, Fowler, Dick & Walker, Wilkes-Barre, Sordoni Construction Co., Wilkes-Barre, general contractors, to Bethlehem Steel Corp., Bethlehem, Pa.
- 440 Tons, La Crosse, Wis., Electric Automobile Co., to Truscon Steel Co.
- 350 Tons, Racine, Wis., St. Luke's Hospital, to Ceco Steel Products Co., Chicago.
- 350 Tons, Chicago, Chicago Housing Authority No. 7 to Joseph T. Ryerson and Sons, Chicago.
- 315 Tons, Washington and Allegheny County, Pa., paving to Electric Welding Co., Pittsburgh.
- 304 Tons, Danvers, Middleton, Topsfield and Boxford, Mass., bituminous concrete and nine bridges. Savin Construction Co., Hartford, Conn., awarded contract.
- 250 Tons, Madison, Wis., Farmers Mutual Auto Insurance Co., Gus K. Newberg Construction Co., contractors, to Joseph T. Ryerson and Sons, Chicago.
- 240 Tons, Westmoreland, Venango and Jefferson County, Pa., to Bethlehem Steel Corp.
- 230 Tons, Pittsburgh, Rieck-McJunkin Dairy Co., to U. S. Steel Supply Co.
- 220 Tons, Torrence, Pa., State Hospital, male employees' building and connecting tunnel, 100 tons, to Bethlehem Steel Corp., and nurses' home and connecting tunnel, 120 tons, to Dambach Co.
- 210 Tons, Pontiac, Ill., Illinois State Penitentiary service tunnels to Joseph T. Ryerson and Sons, Chicago.
- 200 Tons, Group of buildings, Mary Wood College, Scranton, Pa., McCloskey & Co., Philadelphia, general contractors, to Bethlehem Steel Corp., Bethlehem, Pa.
- 200 Tons, St. Paul, American Can Co. to Bethlehem Steel Corp.
- 200 Tons, Sterling, Ill., National Mfg. Co. to Truscon Steel Corp.
- 180 Tons, Warehouse, etc., Gulf Oil Co., Philadelphia, H. E. Baton, Philadelphia, general contractors.
- 175 Tons, Marietta, Ohio, Union Carbide and Carbon Corp., to U. S. Steel Supply Corp.
- 175 Tons, St. Bernard's Church, Philadelphia, John McShane, Inc., Philadelphia, general contractors, to Bethlehem Steel Corp., Bethlehem, Pa.
- 145 Tons, Chicago, apt. bldg., South Shore Drive, to Olney J. Dean Steel Co., Chicago.
- 125 Tons, Chicago, sanitary district settling tanks, to Joseph T. Ryerson and Sons, Chicago.
- 120 Tons, Derby and Ansonia, Conn., bridges on Shelton Derby Ansonia Expressway. Mariani Construction Co., New Haven, Conn., low bidder.
- 100 Tons, Chicago, Little Company of Mary Hospital, to Olney J. Dean Steel Co., Chicago.

ERIE SINGLE LINE BUCKETS

ILLUSTRATED is the hook-on type, for intermittent service. It is reeved and ready for operation on overhead traveling crane, monorail hoist, locomotive crane, derrick, ships tackle or any other hoisting device which has but a single hoisting drum available for bucket duty. Just slip the yoke over the crane hook.

Erie Single Line buckets are also available in the direct-reeved type for permanent installation. Describe your Single Line bucket need — we'll give you our recommendations for we build all types and sizes.

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STEEL CONSTRUCTION COMPANY
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• News of Industry •

Reinforcing bar inquiries this week included the following:

- 4000 Tons, Glasgow, W. Va., Appalachian Electric and Power Co.
- 1500 Tons, Melrose Park, Ill., United Biscuit Co.
- 1400 Tons, Terra Haute, Ind., Wabash River Power House.
- 700 Tons, Chicago, Chicago Housing Authority No. 9.
- 300 Tons, Blue Island, Ill., Calumet Intercepting Sewer Cont. 18-D.
- 220 Tons, Oak Park, Ill., Oak Park Hospital.
- 200 Tons, Blue Island, Ill., Calumet Intercepting Sewer Cont. 18-C.
- 160 Tons, Des Moines, Firestone Tire and Rubber Co.
- 115 Tons, Chicago, addition to Our Lady of Mercy Mission.
- 100 Tons, Cicero, Ill., Goss Printing Co.

Pipe awards this week included the following:

- 1500 Tons, City of Philadelphia Bureau of Water, 48 and 54 in. steel pipe, to Bethlehem Steel Corp., Bethlehem, Pa.

Greenville Gets New Car Orders

Greenville, Pa.—Greenville Steel Car Co. has received a new order from Western Maryland Railway Co. for 100 steel-sheathed box cars and 40 flat cars, and an order from The Akron, Canton and Youngstown Railroad Co. for 50 covered hopper cars. Present orders will keep the Greenville plant busy until mid-1951.

Rust Co. Wins Dock Contract

Mobile, Ala.—A \$744,819 contract to install machinery for the Alabama State Docks' ore tipple has been awarded to the Rust Engineering Co., Birmingham. Expected to be completed in a year, the expansion was made necessary by an increase in imports of foreign ores.

ACF Gets Pennsy Gondola Order

Berwick, Pa.—An additional 1200 fixed end gondolas have been ordered by Pennsylvania Railroad from the American Car and Foundry Co. Total Pennsy freight car orders from ACF during 1950 stand at 4700, all to be built at the Berwick plant.

Fisher Plant Nears Capacity

Pittsburgh—Opened last February, the Fisher Body Co. plant, near this city, is nearing capacity operation with more than 1500 men employed in production of auto doors, fenders, panels, and roofs for General Motors assembly plants. Steel consumption averages about 1400 tons daily.

if these are problem springs

for you ...

see the man who owns a

versatile Torrington spring coiler

In spring coiling, the words "Torrington" and "Versatile" are synonymous!

When producing springs to meet exacting requirements, the professional springmaker with a Torrington coiler is the man to see. He's the man who can supply your needs with accuracy, speed and economy.

On any special spring, our sales department will be glad to help you find a source of supply, or if need be, help the springmaker devise the tooling to produce it.

This is the W-11, one of fourteen versatile Torrington Spring Coilers:

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MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT



W-11

SPECIFICATIONS

Wire Diameter Range:
.015" to .072"

Wire Length per Spring:
0" to 42" (Extra Wire
Feed Gears Available)

Coil Range (O.D.): 3/32"
to 1-9/16"

Production: 23 to 190
springs per minute with
variable speed drive

Torsion and other attach-
ments available



THERE'S MORE TO A SHACKLE THAN SIZE AND TYPE



ACCO SHACKLES are made in both chain and anchor type—of material from $\frac{1}{4}$ inch to 2 inches—with round pin or screw pin—finished self-colored, blacked or galvanized—shipped in kegs or barrels, depending on quantity.

- When a man on a job connects up a shackle he hasn't time to think about how good it is. *"It's the right size and type. Hook it up and let's go!"*

- But when you buy shackles—that's different. You have to remember that there's more to a shackle than size and type. That's where the name Acco is important.

- **ACCO SHACKLES** are forged from fine grain steel which can be depended upon for uniform tensile strength. They're forged in solid dies—most sizes forged already bent. Every one is rigidly inspected under lights which disclose even the smallest defect. (It is almost impossible for a faulty shackle to get by Acco inspectors.)

THE HIGH QUALITY that results from this extreme care in manufacture is characteristic of all Acco chain products—welded and weldless chain, all types of fittings and attachments, assemblies, repair links, cotter pins. For a complete line of high quality chain and chain products, look to **AMERICAN**—*"The Nation's Chainmaker."*

ACCO

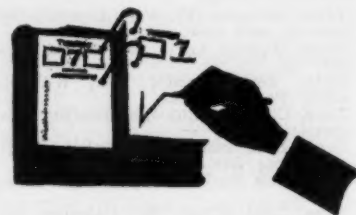
York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.



**AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE**

In Business for Your Safety

Dates to Remember



Oct. 12-13—Gray Iron Founders' Society, annual meeting, Netherlands Plaza Hotel, Cincinnati. Society headquarters are at 210 National City-E. 6th Bldg., Cleveland.

Oct. 14—Nonferrous Founders Society, annual meeting, Hotel Statler, Boston. Society headquarters are at 192 N. Clark St., Chicago.

Oct. 15-17—Conveyor Equipment Manufacturers Assn., convention, Greenbrier Hotel, White Sulphur Springs, W. Va. Association headquarters are at 1129 Vermont Ave., N.W., Washington.

Oct. 16-18—Society of Automotive Engineers, transportation meeting, Hotel Statler, New York. Society headquarters are at 29 W. 39th St., New York.

Oct. 16-20—National Safety Congress & Exposition, Congress Hotel, Chicago. Council headquarters are at 425 N. Michigan Ave., Chicago.

Oct. 18-19—National Conference on Industrial Hydraulics, Sherman Hotel, Chicago. Conference director is Otto J. Maha, Hannifin Corp., Chicago.

Oct. 18-20—Society of the Plastics Industry, annual conference, New Ocean House, Swampscott, Mass. Society headquarters are 295 Madison Ave., New York.

Oct. 23-25—American Gear Manufacturers Assn., semiannual meeting, Edgewater Beach Hotel, Chicago. Association headquarters are in the Empire Bldg., Pittsburgh.

Oct. 23-26—American Institute of Steel Construction, annual meeting, Shamrock Hotel, Houston. Institute headquarters are at 101 Park Ave., New York.

Oct. 23-26—Wire Assn., annual meeting, Lord Baltimore Hotel, Baltimore. Association headquarters are at 300 Main St., Stamford, Conn.

Oct. 23-27—National Metal Congress & Exposition, International Amphitheater, Chicago. American Society for Metals headquarters are at 7301 Euclid Ave., Cleveland.

Oct. 24-25—American Society of Mechanical Engineers, Fuels Div. and American Institute of Mining & Metallurgical Engineers, Coal Div., joint fuels conference, Hotel Statler, Cleveland. ASME headquarters are at 29 W. 39th St., New York.

Oct. 26-28—Audio Engineering Society, audio fair, Hotel New Yorker, New York. Society's address is P. O. Box F, Oceanside, N. Y.

Oct. 29-Nov. 1—National Tool & Die Manufacturers Assn., Annual Convention, Hotel Statler, Cleveland. Association headquarters are in the Union Commerce Bldg., Cleveland.

It takes a tough, rugged KING

(Right) 72" KING Vertical Boring & Turning Machine at Caterpillar Tractor Co., Peoria, Illinois. Piece being machined is a side shift rack for "Caterpillar" No. 12 Motor Grader.

(Below) "Caterpillar" DW 20 4-wheel Diesel Tractor with W20 Wagon. This new high-speed, long-haul, high-capacity, earth-moving combination is the result of five years of intensive research and development. Sturdy parts for both units are precision machined in record time on "Caterpillar's" big, husky KING.

to build
mountain-moving "Cats"!



Men who design and manufacture tough, big-muscled "Caterpillar" products require the same qualities of rugged power and stamina in the machine tools that build them. This 72" New-Series KING has the power, rigidity and range of speeds that make it ideally suited to "Caterpillar's" production requirements.

Here, as in other leading industries, New-Series KING Vertical Boring & Turning Machines are consistently proving their ability to cut costs and improve quality on the complete range of boring, facing, and turning work. Investigate KING's cost-cutting advantages. Ten sizes—30" to 144"—the widest size range in the field.



WRITE FOR NEW CATALOGS

New illustrated KING catalogs give detailed description of machines and complete specifications. Catalog K-1 features machines sizes 30", 36" and 42"; K-2, sizes 52", 62" and 72"; K-3, sizes 84" and 100"; K-4, sizes 120" and 144".

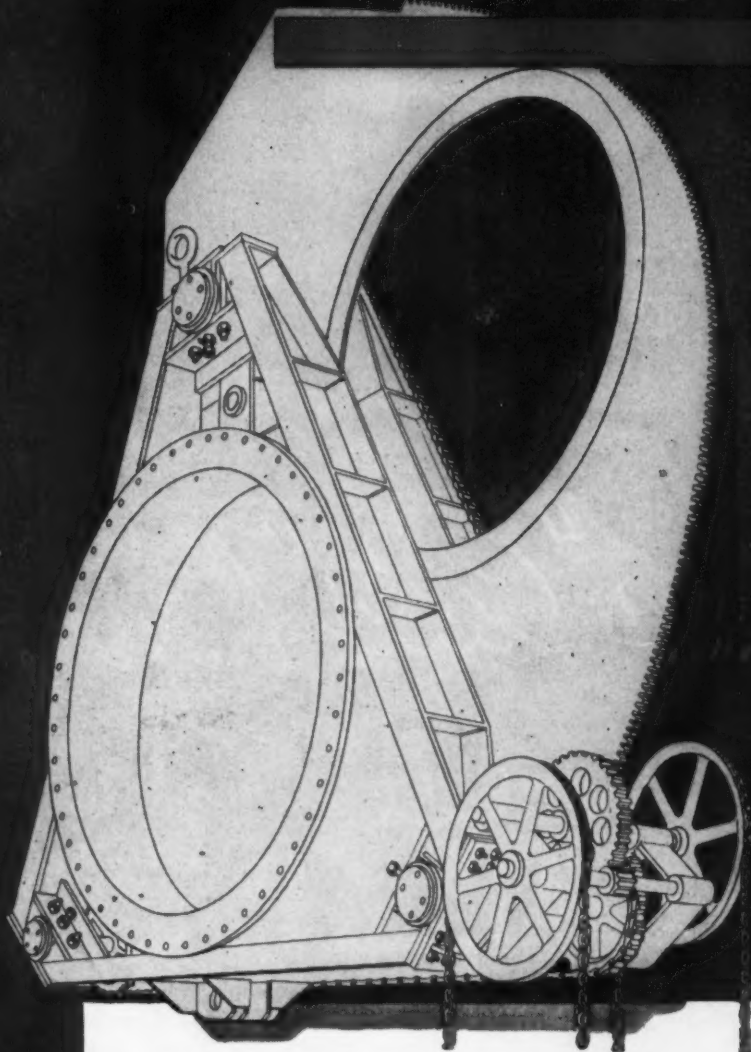
American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of King Vertical Boring & Turning Machines and Sebastian Lathes

new*



Brosius-Westling Goggle Valve

* This complete redesign of a time-tested valve now gives you fastest positive mechanical operation combined with high structural strength and new protection against leakage. Your inquiry is invited.

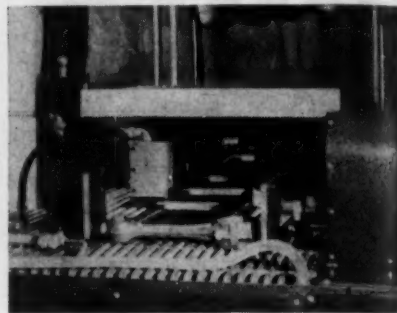


Edgar E.
BROSIUS
Company Inc.

SHARPSBURG - PITTSBURGH 15, PA.

METALLURGIST'S NOTEBOOK

Continued from Page 165



JOB

High volume semi-automatic inspection of assorted automotive forgings and castings.

PROBLEM

In a medium high production heavy duty automotive engine plant, finished machined forgings and castings often contained cracks which caused rejection in the finished state.

SOLUTION

A conveyerized Magnaflux unit was developed to handle the assortment of sizes and shapes concerned. Parts are hand loaded, then automatically processed with fluorescent Magnaflux. Rapid viewing by inspector locates defects, at rates up to 1200 pieces per hr. Good parts are ejected by chute through a demagnetizer and continue to machining.

RESULTS

The unit saves \$600.00 to \$800.00 per week in machining time, labor, and equipment that is not wasted on defective material. Production has increased because plant capacity once wasted on defective material is available to process good pieces.

Data courtesy Magnaflux Corp., Chicago

JOB

Hardening clock shafts.

PROBLEM

Handling the delicate shafts while they were hot caused considerable distortion. Since these were precision products, even slight distortions meant immediate rejection. The shafts were used on a competitive item and production costs determined the success of the product. Decarburization required cleaning.

SOLUTION

Hevi Duty Shaker Hearth furnace was installed.

RESULTS

Bright hardening, without decarburization. No distortion. Identical heat treatment of each shaft. Automatic operation reduced the skill

LEADING MANUFACTURERS*
SPECIFY

DANLY PRESSES

... the key to stamping economy !

On mass-production lines and under exacting precision stamping requirements, Danly presses are establishing new performance records. Outstanding improvements in press engineering, design and construction assure longer uninterrupted production runs, increased die life and greater operating safety.

The new Danly clutch alone, designed to combat heat, major cause of press clutch wear, is proof of Danly press engineering leadership. Other outstanding features include complete pressure lubrication and a specially designed press control system. Write today for specific information on the advantages of Danly Presses in *your* plant.

Send for this new
Danly Straight Side Press Catalog



*The 175 ton straight side DANLY press shown is located in the new A. B. Dick plant, manufacturers of mimeograph office equipment.



MECHANICAL PRESSES . . . 50 TO 3,000 TONS

DANLY MACHINE SPECIALTIES, INC.

DANLY

2100 SOUTH LARAMIE AVENUE, CHICAGO 50, ILLINOIS

EVERYBODY BENEFITS



using
SPEED ALLOY
Hot Rolled Alloy Plate

1 PURCHASING AGENT — Benefits from its availability (plates up to 72" wide and 6" thick) and the fact that it can be purchased flame cut to specified dimensions on a net weight basis, for rectangular plate necessary, making his job easier. Speed Alloy — newest of the SPEED STEELS — is economical from every angle.

2 TOOL & DIE MAKER — Benefits because Speed Alloy is easy to machine — as easy as any machinery steel — and he can get more work done faster. Tool life is longer. Less finishing time is required. Speed Alloy heat treats uniformly and holds its dimensions to extremely close tolerances. Can be welded when necessary.

3 DIE SHOP REPRESENTATIVE — Benefits because he is assured of pleased customers — "Time Saver" Speed Alloy provides economies that enables him to bid lower. Not a kick in a car load. Speed Alloy bridges the gap between carbon and tool steels. Its chromium and molybdenum content qualify it for tough jobs.

4 TOOL AND DIE SHOP'S CUSTOMER — Benefits by faster delivery (because of savings in machining time) lower costs, and quality moldings with fewer rejects. Indiana Foundry, Machine & Supply Co., Brazil, Ind., made the plastic extruding die above, using all three grades of Speed Steel plates, for General Plastics Corp., Marion, Ind., to extrude Tenite sheets 40" wide in thickness from .010 to .060. Different thicknesses are obtained by merely changing the outside die ring. Complete die weighs 2000 lbs. Get the facts — Bulletin 905.

**SINCE
1856**

W. J. HOLLIDAY & CO.
(INC.)

SPEED STEEL PLATE DIV.
139th & Sheffield Ave., Hammond, Indiana
Plants: Hammond and Indianapolis, Indiana

DISTRIBUTED BY

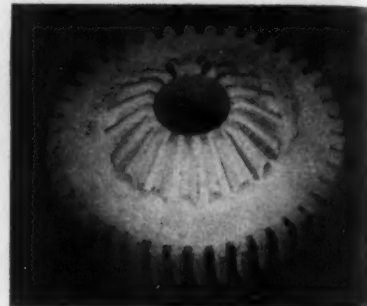
Brown-Wales Co.	Bridgeport Steel Co.	Beals, McCarthy & Rogers
Boston - Hartford - Lewiston, Me.	Bridgeport, Conn.	Buffalo, N. Y.
Burger Iron Co.	Grammer, Dempsey & Hudson, Inc.	Earle M. Jorgensen Co.
Akron, Ohio	Newark, N. J.	Los Angeles-Houston-Oakland
Passaic County Steel Service, Inc.	Peckover's Ltd.	
Paterson, N. J.	Halifax - Montreal - Toronto - Winnipeg - Vancouver	
Peninsular Steel Co.	Pidgeon-Thomas Iron Co.	Horace T. Potts Co.
Detroit, Mich.	Memphis, Tenn.	Philadelphia - Baltimore

METALLURGIST'S NOTEBOOK

(Continued)

needed for heat treating the shafts and increased production.

Data courtesy Hevi Duty Electric Co., Milwaukee



JOB

Make a beveled miter gear for the gear train of an office machine, where stresses are not high.

PROBLEM

To mold this bevel type gear, which previously had not been made by powder metallurgy, thereby eliminating the two parts plus the assembly of the former cut gears.

SOLUTION

A steel alloy was selected, and after considerable experimentation with tools a satisfactory design and molding procedure was found.

RESULTS

These gears are now being produced at the rate of approximately 250 per hr.

Data courtesy of Powdered Metal Products Corp. of America, Franklin Park, Ill.

JOB

Homogeneous carburizing.

PROBLEM

Cast alloy retorts gave only 1900 hr of service under the abnormally severe operating conditions, or a heat-hr cost of 52c.

SOLUTION

Fabricated retort of 3/16-in. thick Inconel sheet was installed.

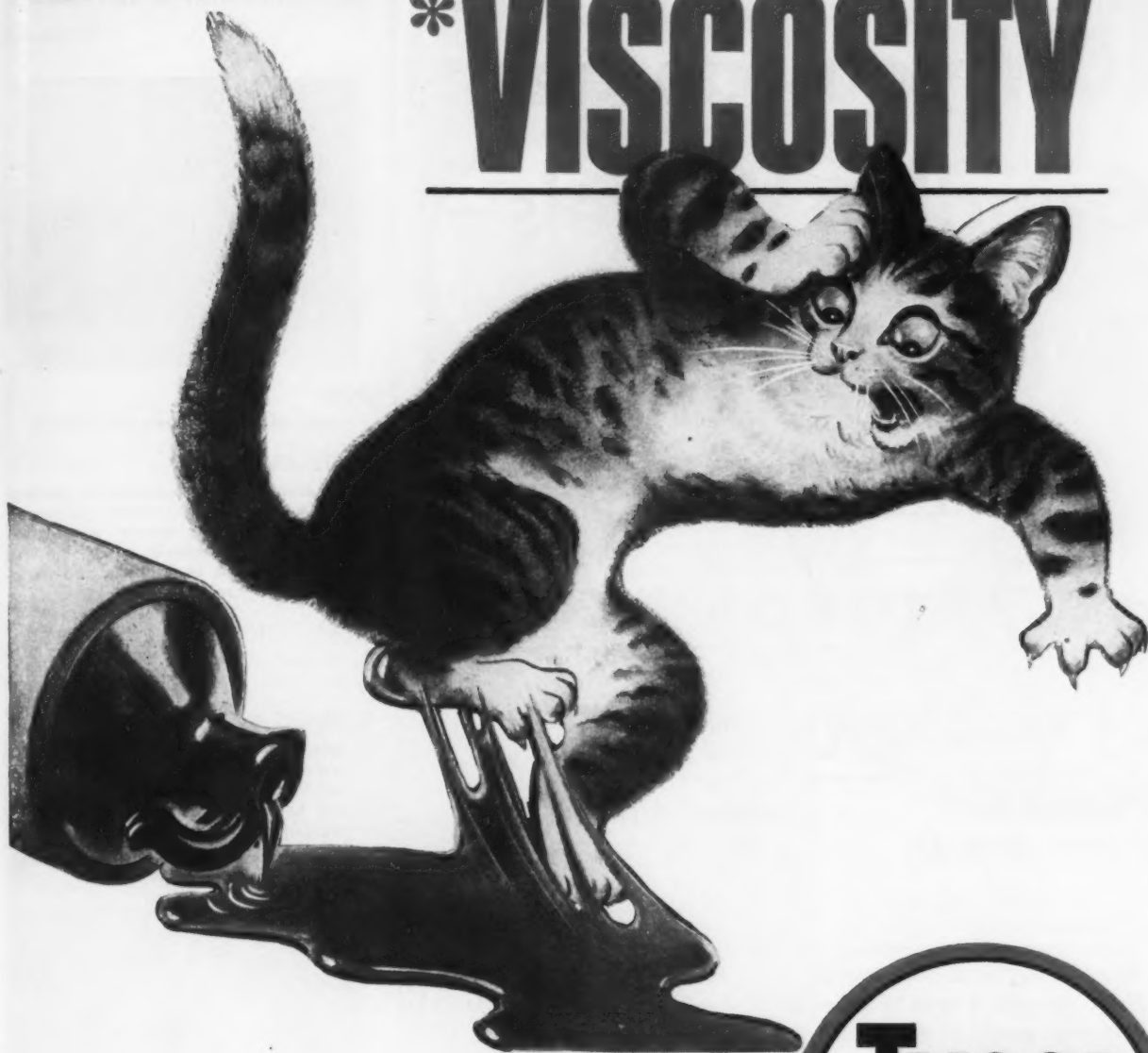
RESULTS

Gross savings of 22 pct in initial investment. Heat-hr costs reduced to 13 1/2c per hr; the fabricated retort has been in service for over 5700 hr to date and is expected to have many more hours of life. Minimum savings of over 74 pct in heat-hr costs. Complete elimination of maintenance shutdowns, no loss of production. No detectable atmosphere leakage. Element life extended.

Data courtesy of Rolock Inc., Fairfield, Conn.

Turn to Page 202

*VISCOSITY



All equipment will last longer — give better service — if you use the proper lubricant. That's why you'll find it profitable to use Tycol high quality oils and greases.

There's a reason! No matter what your lubrication need — for roll neck bearings or mine cars, Diesels or high speed textile spindles, turbines, paper calenders or steam engines . . . where *VISCOSITY, penetration, extreme pressure is a factor — Tycol has a lubricant suited to your specific requirements.

Refined from selected crudes, Tycol lubricants are exceptionally resistant to breakdown which means greater economy . . . longer life for every type of equipment.

Let us show you the extra value in every measure of Tycol lubricants. Write your nearest Tide Water Associated office today.



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Detroit • Tulsa • Cleveland
San Francisco • Toronto, Canada



*LEARN WHAT THIS PRODUCT CHARACTERISTIC MEANS TO YOU — READ "LUBRICANIA"
This informative handbook, "Tide Water Associated Lubricania," gives clear, concise descriptions of the basic tests used to determine important properties of oils and greases. For your free copy, write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

REFINERS AND MARKETERS OF VEEDOL — THE WORLD'S MOST FAMOUS MOTOR OIL

Now you can get Grinding Wheels— especially made for your work— at no greater cost and without delay!

- BETTER FINISH
- LONGER WHEEL LIFE
- EASIER CUTTING
- REDUCED GRINDING COST

The factors listed at the right all enter into determining the *best* grinding wheel or disc for each job. Figure the odds in favor of custom-made wheels over stock grades in meeting these specific job requirements . . . and giving you better work at lower cost.

Besly-Titan is set up to produce grinding wheels and discs to *individual job specifications* at no more than you'd pay for ordinary stock wheels—and delivers in a few days! What's more, Besly-Titan field engineers work with you on the specifications. We'll *prove* the savings and work improvement you can gain from wheels and discs especially made for *your work*.

We're doing this for many large companies.
We can do it for you. Write us.

BESLY

CHARLES H. BESLY & COMPANY



122 N. Clinton Street • Chicago 6, Illinois
Factory: Beloit, Wisconsin

BESLY TITAN

Engineers check for these variable conditions — and recommend Custom-Made Wheels to meet them exactly:

Kind of Material
Amount of Stock Removal
Reliefs to Grind
Degree of Finish
Tolerances (flatness, parallelism, size)
Model of Grinder and Condition
Wet or Dry Grinding
Speeds of Work and Spindle
Fixtures or Free Hand Grinding

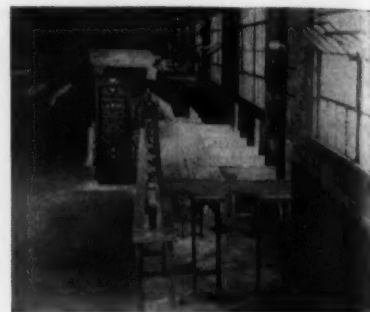
Write for
FREE
CATALOG



Lists all types and sizes of wheels and discs.

METALLURGIST'S NOTEBOOK

Continued



JOB

Inspecting steel bars and tubing.

PROBLEM

Finding a quick, inexpensive method of inspecting tool steel grades of wire rod, which would indicate all types of mechanical faults as well as any mixups in analysis and variations in structural conditions.

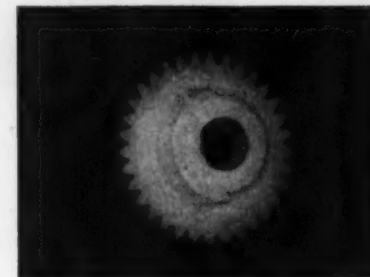
SOLUTION

Magnetic Analysis equipment was installed.

RESULTS

Inspection speed of 150 fpm was maintained. Many conditions, such as intermittent pipe, which could not be found in any other way, are indicated.

Data courtesy of Magnetic Analysis Corp., New York



JOB

Manufacture a helical gear for an inexpensive household appliance in large quantities.

PROBLEM

To form a helical gear, a new phase of powder metallurgy, of a suitable material which, when running against the worm, would give good bearing qualities and not wear the worm nor the teeth of the gear.

SOLUTION

A self-lubricating type of bronze alloy was tried and found to be very satisfactory.

RESULTS

The gears can now be made at the rate of approximately 750 per hr from one set of tools.

Data courtesy of Powdered Metal Products Corp. of America, Franklin Park, Ill.

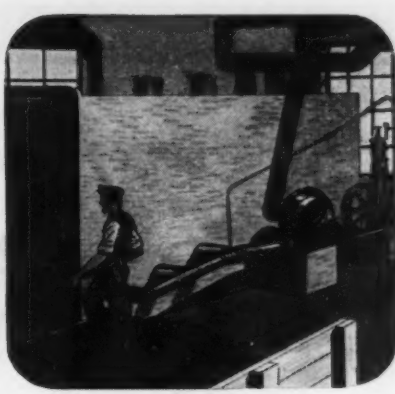
Turn to Page 204



1 1561—A crude, manually operated bellows like this was used in an attempt to pump fresh air into a mine in Switzerland. And man's quest for comfort, by putting air to work, was under way.

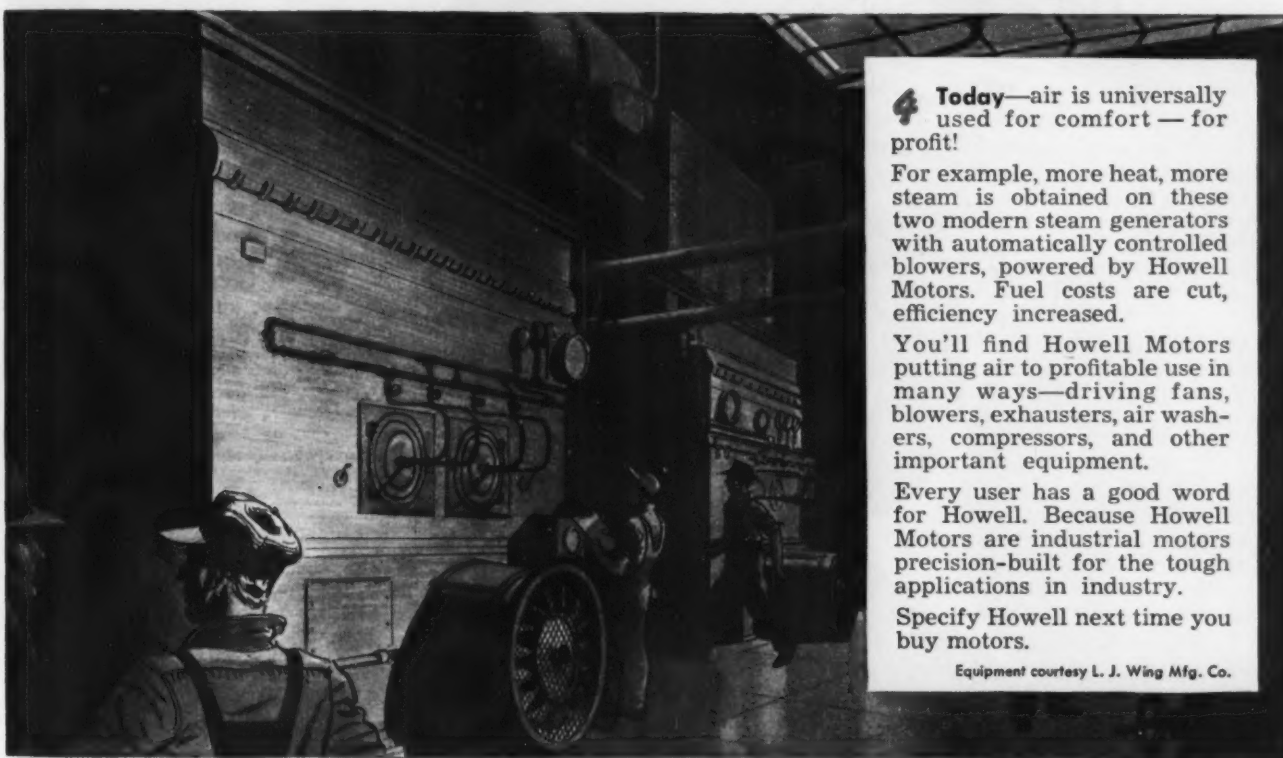


2 1700—This age-old method of moving air for its cooling effect was used in many parts of the world. Needed was a form of low-cost power that would move air mechanically, automatically, and efficiently.



3 1873—This steam-operated, forced draft fan promoted efficient burning of fuel in boilers. By 1915, Howell Electric Motors arrived. The era of electrical power put the handling of air on a paying basis.

NOW... AIR IS PUT TO PROFITABLE USE!



4 Today—air is universally used for comfort — for profit!

For example, more heat, more steam is obtained on these two modern steam generators with automatically controlled blowers, powered by Howell Motors. Fuel costs are cut, efficiency increased.

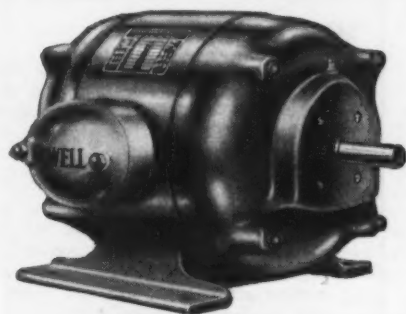
You'll find Howell Motors putting air to profitable use in many ways—driving fans, blowers, exhausters, air washers, compressors, and other important equipment.

Every user has a good word for Howell. Because Howell Motors are industrial motors precision-built for the tough applications in industry.

Specify Howell next time you buy motors.

Equipment courtesy L. J. Wing Mfg. Co.

Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.



Howell Protected-Type Motor

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.
Precision-built Industrial Motors Since 1915



"MULTICUT" "TUF CUT" "HOT WORK"

Wapakoneta SHEAR BLADES and ROTARY KNIVES



Any type or size blade of proper Alloy with correct hardness and temper for every type shearing machine and every kind of job.



**R_x ENGINEERED
TO THE JOB**

Every Wapakoneta blade is made to exact specifications, designed for the particular job. Complete records with order number of each blade makes possible duplication of exact size and temper at any time.

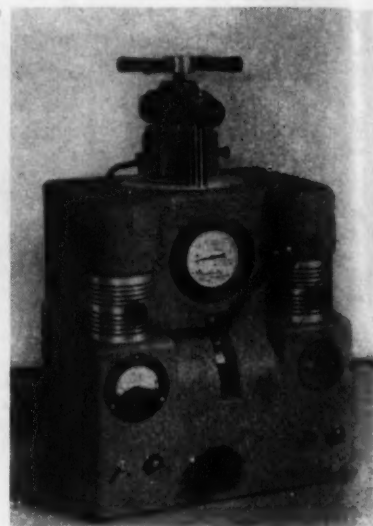
The WAPAKONETA MACHINE CO.

Shear Blade Specialists Since 1891

Wapakoneta, Ohio

METALLURGIST'S NOTEBOOK

Continued



JOB

To mount small metallurgical samples in plastic so that samples may be held conveniently during polishing and examination.

PROBLEM

To lower cost by increasing production per hour. With standard specimen mount press, an operator could produce about 7 mounts per hour.

SOLUTION

Installation of new Buehler Speed Press using preheated premolds. Production of operation increased to 24 mounts per hour. Operation is faster, cleaner and product is more uniform. Diameter of mount may be 1, 1 1/4, or 1 1/2 in. Tools are readily interchangeable.

RESULTS

Production increased over 200 pct.
Data courtesy Adolph I. Buehler Co., Chicago

JOB

Hot sulfuric acid pickling.

PROBLEM

Extending pickling efficiency of pickle. Original tank, whether charged with raw or inhibited sulfuric acid, had never run more than three weeks without dumping.

SOLUTION

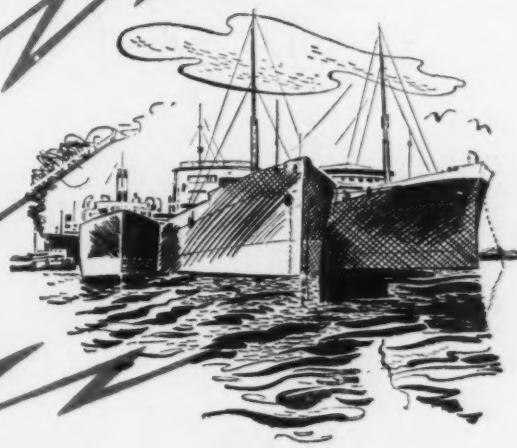
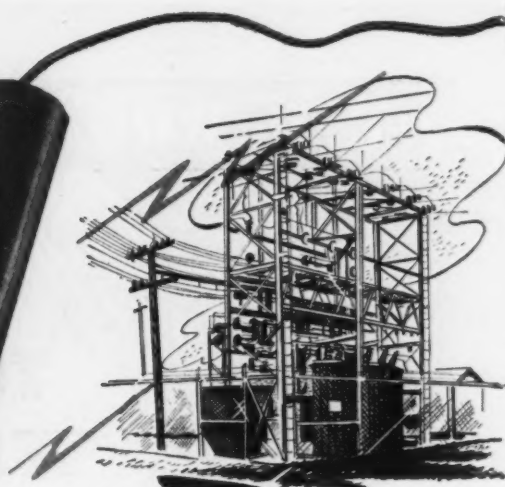
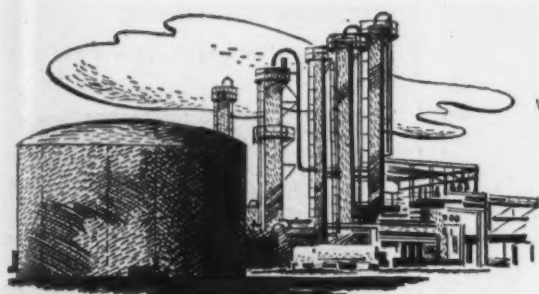
Oakite Pickle Control No. 3 inhibitor was added. Tests were made in a 6000-gal tank used for rust and scale removal on pipe.

RESULTS

Savings during first month of over \$4000.00; tank operated at high pickle efficiency after 7 weeks; savings in acid and steel by restricting action of bath to rust and scale. Alkali neutralizer required for disposal reduced 50 to 70 pct.

Data courtesy of Oakite Products, Inc., N. Y.

Resume Your Reading on Page 166



PROTECT METAL

**STRUCTURES POSITIVELY
UNDER ALL CONDITIONS!**

"NATIONAL" GROUND ANODES

● Regardless of what the job is... how corrosive the environment — whether wet or dry, hot or cold — you can depend upon "National" ground anodes to provide efficient, positive protection against underground and underwater corrosion.

"National" ground anodes have proved themselves in 20 years of successful operation in many different parts of the country. They outlast other materials by a wide margin. They do not have to be dug up and replaced every couple of years. Because they use a controllable current source, it is simple and economical to adjust their protective output to match exactly the requirements of any installation.

For complete details on "National" ground anodes, write to National Carbon Division, Union Carbide and Carbon Corporation, Dept. Z.

The terms "National" and "Eveready" are registered trade-marks of

**NATIONAL CARBON DIVISION
UNION CARBIDE AND CARBON CORPORATION**

30 East 42nd Street, New York 17, N. Y.

District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

Foreign Department: U. S. A.

MORE THAN DOUBLE THE USABLE LIGHT!

The biggest news since the invention of flashlights—the brand new leakproof

"Eveready" No. 1050 flashlight battery—gives more than double the usable brilliant white light for critical uses than any other flashlight battery we ever made.

**NO METAL CAN
TO LEAK OR CORRODE**

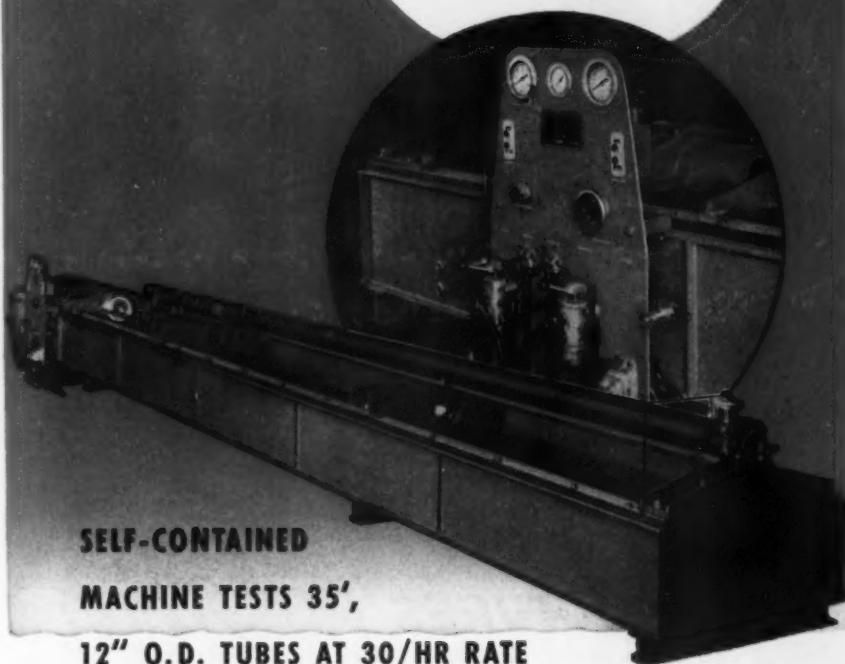


October 12, 1950

205

R. D. WOOD

Hydraulic TUBE TESTER



**SELF-CONTAINED
MACHINE TESTS 35',
12" O.D. TUBES AT 30/HR RATE**

HYDROSTATIC testing of tubes is fast and easy on this completely self-contained machine. It handles tubes 4½" to 12" of maximum 35' length at preset test pressures of 700 to 1500 pounds, sealed on the ends, outside or inside diameters as desired. Maximum diameter and length tubes are tested at an average rate of one every 2 minutes, but smaller size or shorter length tubes give proportionately larger production.

The entire cycle of automatic tube admission, centering, clamping, testing, draining and ejection is single-operator worked from one control panel. Write today for complete information.

HYDRAULIC PRESSES AND VALVES FOR ENERGY PURPOSE • ACCUMULATORS • ALTERNATORS • INTENSIFIERS

EST. 1803



R.D. Wood Company

PUBLIC LEBOR BUILDING, PHILADELPHIA 3, PA.

WELDING NOTEBOOK

Continued from Page 171



JOB

Fabrication of small complicated weldment.

PROBLEM

To hold workpiece and position it into any position with maximum speed and minimum operator effort.

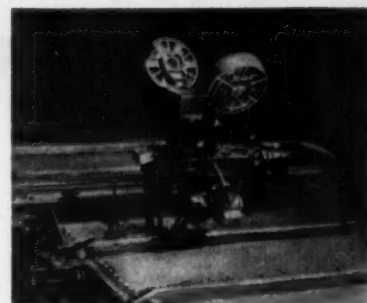
SOLUTION

Installed Universal Balanced Positioner, which enables operator to push workpiece into any position with no more than 5 lb force.

RESULTS

Production increase of 50 pct over jobs where no positioner was formerly used, 20 pct over jobs formerly handled on home-made turnion positioner.

Data courtesy Aronson Machine Co.,
Arcade, N. Y.



JOB

Joining stakes to side panels of railroad cars.

PROBLEM

Stakes to be welded on each side, requiring two welding operations per stake.

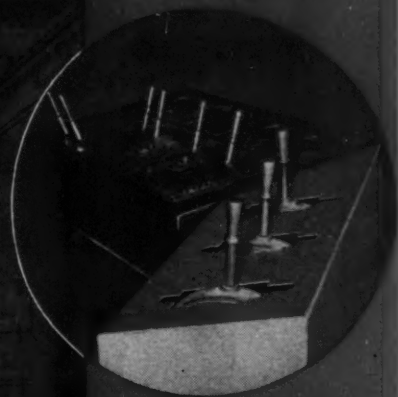
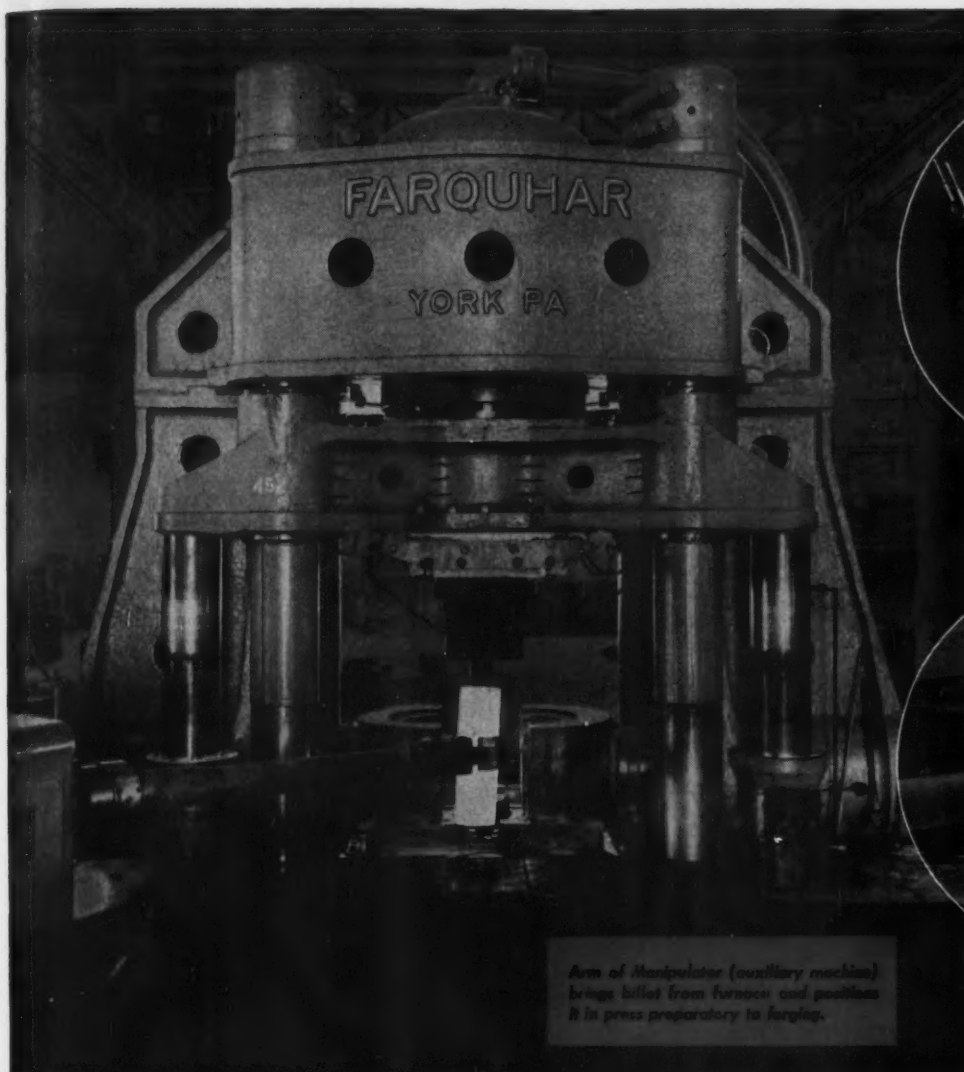
SOLUTION

Welding setup arranged utilizing two Unionmelt welding heads, arranged to weld both sides of stake simultaneously.

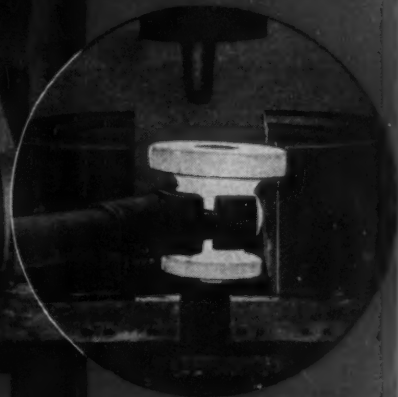
RESULTS

Production doubled.
Data courtesy Linde Air Products Co.,
New York

Continued on Page 208



Above: Remote Farquhar control panel which is handled by one operator for controlling all press operations.



Above: Manipulator arm removing finished forging from press. One operator handles manipulator, another helps guide the positioning of billet.

Arm of Manipulator (auxiliary machine) brings billet from furnace and positions it in press preparatory to forging.

FARQUHAR HYDRAULIC PRESS

turns out better forgings *faster* for Cameron Iron Works

THIS GIANT 5000-ton Farquhar Hydraulic Press has a big job to do at the Cameron Iron Works, of Houston, Texas —and it's doing it!

Cameron needed faster and better production of tubing head spools which are used for well completions in the oil industry. These parts had formerly been produced from steel castings. By using the built-to-specification Farquhar Press to turn out 800-lb. forgings of the spools instead (see illustrations), Cameron speeded up production, saved time and labor.

Advantages of forgings by the Farquhar Press over the castings are: *Cheaper to produce... Forgings free from porosity... Uniform in physical properties... Controlled in grain structure.* And—the Farquhar Press operated at a minimum of maintenance cost. Cameron gets higher quality at lower costs for this operation—

still can convert the Press for other production jobs in the future.

Farquhar Presses Cut Your Costs

Just one more example of cost-cutting Farquhar performance in heavy production. Farquhar Presses are built-for-the-job... Presses that assure *faster production* due to rapid advance and return of the ram... *greater accuracy* because of the extra guides on moving platen... *easy, smooth operation* with finger-tip controls... *longer die life* due to positive

control of speed and pressure on the die.

Farquhar engineers are ready to help solve whatever production problem you may have. Give them a call.

Send For Free Catalog showing the wide range of Hydraulic Presses Farquhar builds in all sizes and capacities for all types of industry. Your **FREE** copy is waiting. Write to: A. B. Farquhar Company, Hydraulic Press Division, 1503 Duke St., York, Pa.

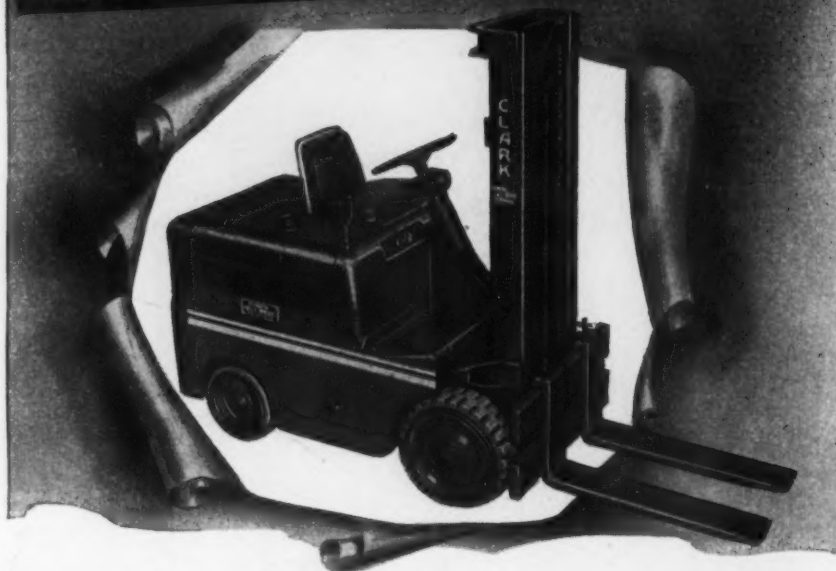




HYDRAULIC PRESSES

for Bending • Forming • Forging • Straightening • Assembling • Drawing
Extruding • Joggling • Forging • and other Metal-working Operations

DYNATORK DRIVE MAKES A BETTER CLARK CARLOADER!



FASTER! *from forward to reverse*
IT DOES MORE WORK!

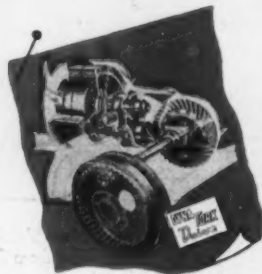
EASIER! *to operate than your car*
IT DOES MORE WORK!

BETTER! *neutral tests prove*
IT DOES MORE WORK!

HERE'S A COMBINATION DESTINED TO MAKE MATERIALS HANDLING HISTORY—

• The husky and versatile gas-powered Carloader fork-lift truck of 3,000-, 4,000- and 5,000-lbs.-capacities, has done more than any other one model to establish Mechanized Materials Handling as essential to modern high-speed, low-cost production.

• The revolutionary Dynatork Drive cuts deeply into handling costs by increasing as much as 20 per cent the amount of work a fork truck can do. It transmits engine power to the drive wheels by magnetic induction, through an air gap—no clutch, no conventional transmission. It's unique because it does not have to be brought to a stop before reversing.



This combination of CAR-LOADER® and DYNATORK® DRIVE constitutes a forward step of enormous significance to the science of Materials Handling. You'll want to know all about it. A Clark bulletin will bring you the facts in convenient form. Write for it . . . or simply fill in the coupon and mail it.

*Trade Mark Reg. U. S. Pat. Off.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS



INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 51, MICH.

Please send: ☐ Literature on Carloader with Dynatork Drive
☐ Movie Digest ☐ Material Handling News

Name _____

Firm Name _____

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City _____ Zone _____ State _____

AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

WELDING NOTEBOOK

Continued



JOB

Salvage welding of large castings.

PROBLEM

To insure sound weld, castings must be heated to 1100°F, welded at approximately 1000°F, and annealed. To make salvage economical, heating equipment must be able to efficiently handle fluctuating load, since number of castings to be repaired in any given period cannot be controlled or predicted.

SOLUTION

Installed specially-designed two-row pusher type furnace, with double chamber at heating end. The two rows operate in opposite directions.

RESULTS

Flexibility and substantial fuel economy obtained, as cold castings moving toward heating end as they are being heated prior to welding, receive heat from castings on cooling during annealing cycle on row moving away from heating end of furnace.

Data courtesy Holcroft Co., Detroit

JOB

Making trowler shoes, the steel blades used in finishing the inside surface of concrete pipe.

PROBLEM

At a California pipe plant, trowler shoes averaged a service life of only 3 hr, due to extreme abrasion.

SOLUTION

Shoes were hardfaced with Amsco Tube Tungsten 30-40, a welding electrode of tungsten carbide particles in a mild steel tube.

RESULTS

Test shoes hardfaced with tungsten carbide served for a full 8-hr shift. In addition, blades can be repeatedly refaced for further service instead of being discarded after wear as was formerly done.

Data courtesy American Brake Shoe Co., New York

Continued on Page 210

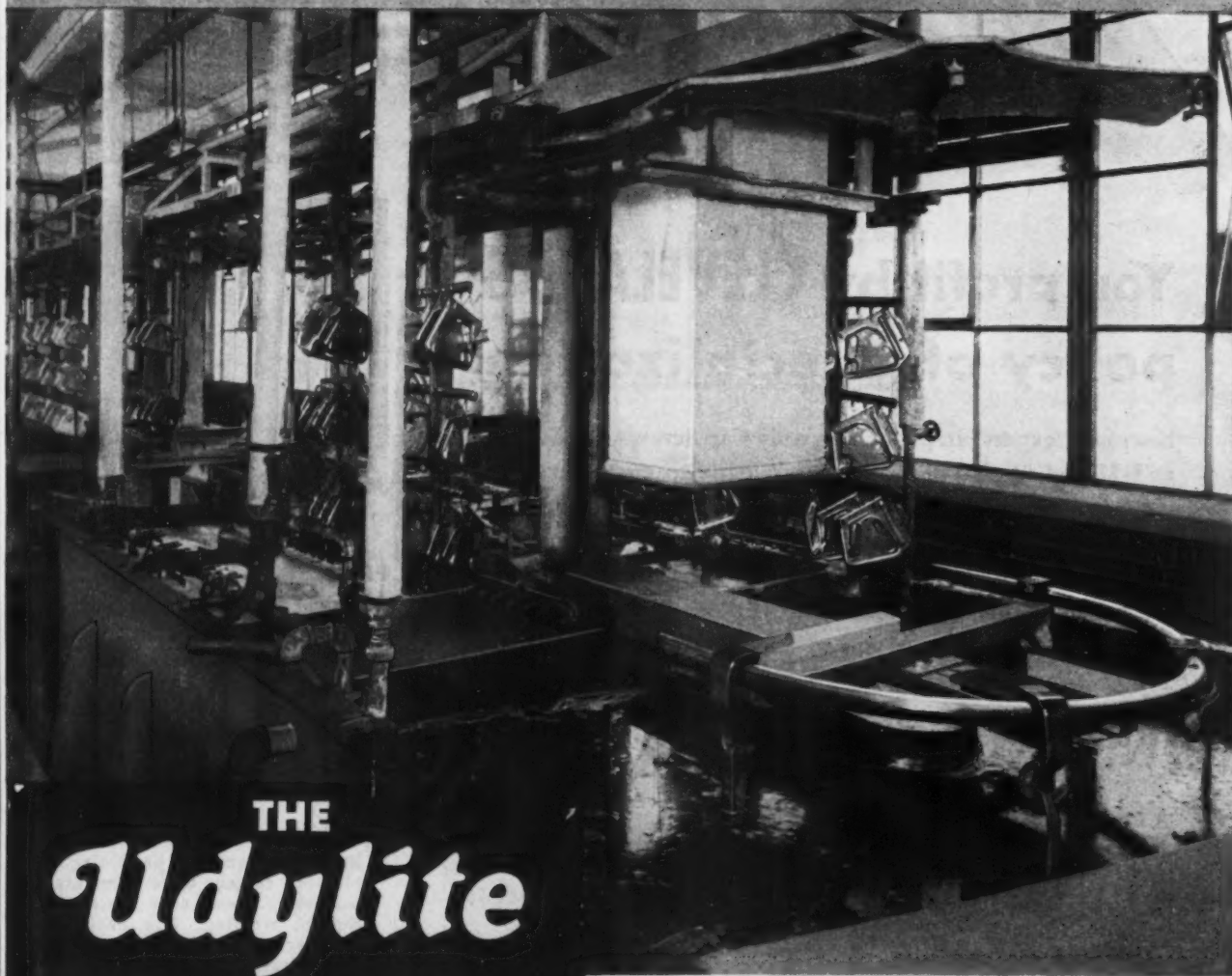
5 days FROM FACTORY TO FULL OPERATION FOR THIS *Udylite* FULL AUTOMATIC

There's a new Udylite Full Automatic Plating Machine at Howard Plating Industries, Inc., Detroit, which was shipped on Thursday and in full operation the following Tuesday. This rapid installation is a matter of course with Udylite. For Udylite Full Automatics are completely assembled at the factory—ready to run at the turn of a switch. Installation is merely a matter of moving in the equipment—hooking it up and filling the tanks with solution. Naturally, this feature pays off with lower installation expense and a minimum of lost production time.

There are many other advantages to Udylite equipment, too. Horace Jones, plating superinten-

dent at Howard Plating Industries, reports: "Our new Udylite Full Automatic has been operating 18 hours a day, six days a week, for over a year. It's a 100% plating operation, and plating everything from jet engine parts to dime store novelties. We've spent nothing on repairs and very, very little on maintenance. Production is up 25% and we've cut labor costs in half. Believe me, we're really sold on Udylite."

Udylite Plating equipment can bring many advantages to your plating operations. Call in your Udylite Technical Man today, let him analyze your problems and show you the way to more profits in plating—or write us direct.



THE
Udylite

CORPORATION
DETROIT 11, MICHIGAN

PIONEER OF A BETTER WAY IN PLATING



You profit by CLEVELAND'S policy of Specialization

Keeping "expert" in producing only Cap Screws, Set Screws and Milled Studs—plus "specials" made to customers' designs—is assurance that Cleveland's policy of Specialization brings you *Top Quality* Fasteners. We concentrate on making a few items well. . . . It's important, too, that by specializing we can make the much abused word "Service" really mean something. . . . It pays you to specify and buy Cleveland *Top Quality* Fasteners.

THE CLEVELAND CAP SCREW COMPANY

2917 East 79th Street, Cleveland 4, Ohio

Warehouses: Chicago, Philadelphia, New York, Providence

CLEVELAND
Top Quality
FASTENERS

ORIGINATORS OF THE
KAUFMAN **DOUBLE EXTRUSION** PROCESS

Specialists for more than 30 years in
CAP SCREWS, SET SCREWS, MILLED STUDS

Ask your jobber for Cleveland Fasteners

WELDING NOTEBOOK

Continued



JOB

Fabrication of carpet rolls, using 1½-in. butt weld to joint Type 304 stainless steel roll to mild steel head.

PROBLEM

Meet production schedules by reducing welding time, without sacrifice of quality.

SOLUTION

Change from former welding methods to Aircomatic welding process.

RESULTS

Welding time per roll was reduced from 6 hr to 1½ hr, and material costs reduced 25 pct.

Data courtesy Air Reduction Sales Co., New York



JOB

Manufacture of aluminum coolant separators, in four different sizes.

PROBLEM

Obtain high production, with minimum cost.

SOLUTION

In design, instead of enlarging all dimensions on separators of increased size, dimensions of end sections were made standard for all sizes, with width of center sections only variable. Assemble by welding.

RESULTS

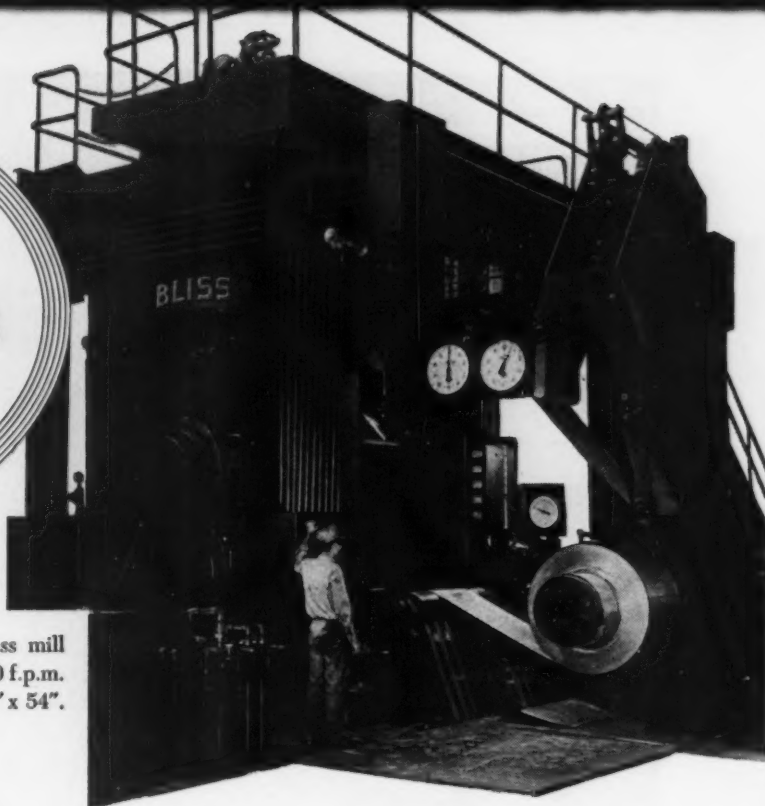
Usual problems of producing complicated casings were eliminated by assembly from cast sections by Hellarc welding. Use of identical end sections reduced pattern and other costs, simplified assembly, increased production rate.

Data courtesy Linde Air Products Co., New York

Continued on Page 212

South's Leading Steel Plant Specifies Bliss Again!

This new Bliss temper-pass mill rolls 20-gauge steel at 3,000 f.p.m. It is four high, 21" and 53" x 54".



This four-high temper-pass mill and a two-high sheet and coil mill are the latest additions to the complete array of Bliss rolling mill machinery, producing quality steel and tinplate at the South's leading steel plant.

Both Bliss mills have operated continuously since early 1949 to keep pace with the company's growing demands from Southern industries. They have met every test in finish rolling a full range of steel from 30 to 13 gauge, 20" to 48" wide, at maximum speeds. Last month the four-high mill rolled a record 652 tons in an eight-hour day.

Tinplate (750 tons daily) is rolled to can-makers' precise "Specs" for flatness and temper in five Bliss two-stand tandem mills installed in 1938. They are delivering production even beyond rated capacity.

In hot working, too, rugged Bliss mills are key equipment. A scale breaker and six-stand, four-high tandem mill reduce hot steel slabs at the rate of 2,000 feet per minute.

Next time you need rolling mills or accessories call a Bliss engineer. He will be glad to analyze your equipment problem and submit recommendations without obligation.

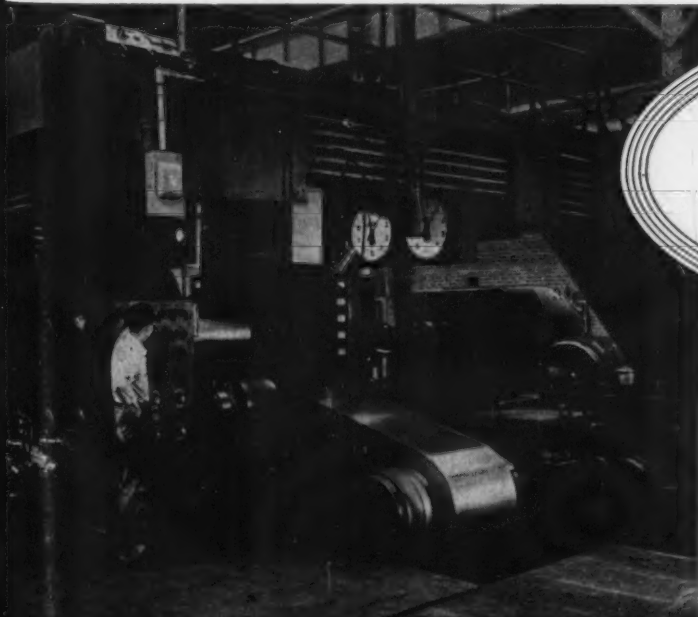
E. W. Bliss Company

General Office: Toledo 7, Ohio

Rolling Mill Division

Salem, Ohio

Both sheet and coil steel, from 30 to 13 gauge—20" to 48" wide—are finish rolled in this new Bliss two-high mill.



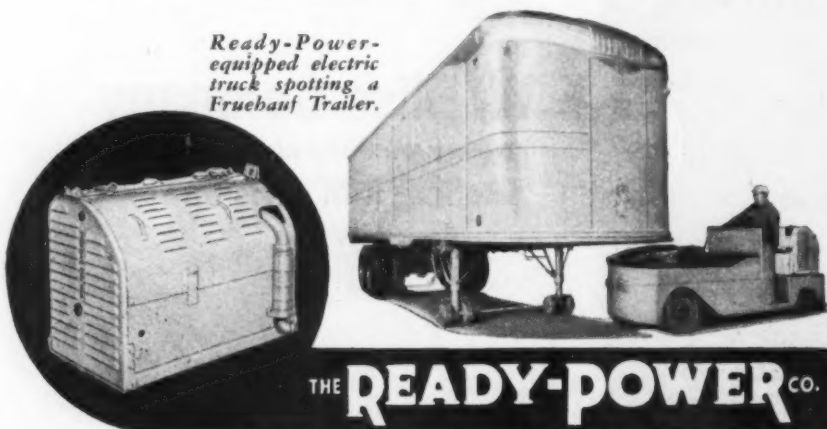


Ready-Power-equipped Yale Truck, stacking automobile parts.

power unlimited WITH READY-POWER

There's a world of power in Ready-Power-equipped electric trucks and it's yours in any amounts needed to handle your jobs with utmost efficiency. Ready-Power gas-electric Units generate dependable electric current, in unlimited amounts, right on the truck chassis. Keep them working as many hours as you want. They won't slow down. Equip any make truck with Ready-Power.

Ready-Power-equipped electric truck spotting a Fruehauf Trailer.



3822 Grand River Ave., Detroit 8, Michigan

WELDING NOTEBOOK

Continued

JOB

Manufacture of sand muller plows.

PROBLEM

Plow blades on sand muller machines, exposed to severe abrasion, required replacement about every 4 days. Replacement takes two men from 3 1/2 to 5 hr.

SOLUTION

Plow abrasion resistance increased by hardfacing with tungsten carbide weld rod.

RESULTS

Useful life of plows was increased 32 times. User estimates hardfacing will save almost \$800 in castings and labor alone, not considering reduction of lost production time when shut down to replace plows.

Data courtesy American Brake Shoe Co., New York

JOB

Hardfacing of gate valve ring for handling high pressure steam.

PROBLEM

Using hand welding, production was only 4 rings per day.

SOLUTION

Adopted mechanized process for applying hardfacing material.

RESULTS

Each 24-in. gate valve ring is now faced with 6 1/2 lb of material in 40 min. Deposit is smoother, reducing finishing costs.

Data courtesy Haynes Stellite Co., Kokomo, Ind.

JOB

Preparing aircraft parts of 245, 615, 25 and 35 for spotwelding.

PROBLEM

Improving preparation of surface so that more spotwelds could be made between electrode cleanings.

SOLUTION

Preparation cycle adopted involving 5-min immersion in Diversey No. 6 solution, 3-min immersion in fresh water, 12-min immersion in Diversey No. 514 solution, 4-min immersion in cold water, 10-min oven dry.

RESULTS

Surfaces prepared by new method gave 4 to 5 times more spotwelds than former methods of surface preparation, before it is necessary to clean electrode tips, at 25 pct of former tank charging cost.

Data courtesy Diversey Corp., Chicago

Resume Your Reading on Page 172

NEW

**compactness
economy
efficiency**

Line-O-Power drives



Trim, efficient, rugged, these new drives offer power transmission at lower original cost and at lower operating cost.

Line-O-Power is ideally suited to the requirements of the original equipment manufacturer, who needs the sales appeal of compact and modern looking straight line drives as part of his equipment. He knows that the ultimate user is certain to benefit from the lower maintenance costs and the high efficiencies (over 96%) that Line-O-Power is designed to meet.

Investigate today the advantages that Line-O-Power has to improve the general design of your machines and equipment.

FOOTE BROS. GEAR AND MACHINE CORPORATION

Dept. M, 4545 S. Western Blvd., Chicago 9, Ill.

BUY LINE-O-POWER BECAUSE—

Duty-Rated helical gears made to precision accuracies and having file hard tooth surfaces (60 Rockwell C) offer the maximum in long life and quiet operation. Gear tooth cores are processed to maximum strength and ductility for resistance to intermittent peak overloading conditions.

Cast Iron Housings give the strength and rigidity needed to maintain accurate alignment of all moving parts. Rugged, dense, cast iron housings do not distort under load.

Large Range of ratios, and horsepower capacities from 1 through 175 horsepower, provide a unit for practically any heavy-duty application.

FOOTE BROS.

Better Power Transmission Through Better Gears

WRITE FOR BULLETIN LPA

Footo Bros. Gear and Machine Corporation
Dept. M, 4545 S. Western Blvd., Chicago 9, Illinois

Please send me a copy of Bulletin LPA on Foote Bros. Line-O-Power Drives.

Name.....
Company.....
Position.....
Address.....
City.....State.....

To reduce rejects at the point of assembly, use forgings. *Forgings* offer almost a 100 per cent yield of sound parts because forgings are unusually free of concealed defects. This REFERENCE BOOK on forgings reveals the full significance of all the engineering, production and economic advantages that forgings offer.

Write for it.



Ask a forging engineer to explain how you can obtain the correct combination of mechanical qualities in forgings required for your product.

**DROP FORGING
ASSOCIATION**

605 HANNA BUILDING
CLEVELAND 15, OHIO

Please send 60-page booklet entitled "Metal Quality—How Hot Working Improves Properties of Metal", 1949 Edition.

Name.....

Position.....

Company.....

Address.....

Latest in Airplane Fashions Shown at British Air Exhibition

London—The inventories of the British aircraft industry, always one of the world leaders, were displayed at the Society of British Aircraft Constructors' annual flying show at Farnborough. Of the 58 planes displayed, 30 made their debut under the towering canvas roof of the largest tent ever put up in the United Kingdom.

One of the significant exhibits was that of the Ministry of Supply—a new rocket motor, the Beta, designed as a power unit for experimental planes. Also shown was the Bristol Brabazon, reportedly the world's largest civil land-plane which can land and take off from a standard runway.

All-Jet Airliners

The gas-turbine engine for airline planes was also featured and it was predicted that by the next show the pure-jet airliner may have joined the turbopropeller jobs on scheduled routes.

Taken off the secret list in time for the exhibition was the de Havilland Venom Night Fighter, which was said to be the fastest plane in the show. One of the new jet fighters, built for the Royal Navy and called the Hawker Sea Hawk, put on a show for spectators. It did 600 mph, flew a vertical roll, and disappeared into a cloud, flying upside down.

Detroit to Get New Power Plant

Detroit—Plans for a 400,000 hp electric generating plant on the St. Clair River between Marine City and St. Clair have been announced by Detroit Edison Co. The new plant, to cost \$35 million, will be equipped with two steam turbo-generators rated at 125,000 kw each and is scheduled for completion in 1953.

Scrap Specs Adopted by Canadians

New York—Formal adoption of the nonferrous scrap metals specifications of the National Assn. of Waste Material Dealers, Inc., by the Canadian Secondary Materials Assn. has been announced.

Why ROLLWAY'S RIGHT ANGLE DESIGN

**Steps Up Performance...
...Keeps Down Costs**

Bearing life and performance are stepped up and kept up, maintenance and replacement costs drop, because of the *inbuilt trueness* of Rollway's right angle design. This basic precision principle greatly reduces sliding friction, end-rub, side-shock of the rollers. It balances the internal forces within each bearing, and promotes *true rotation* of the rollers around the shaft.

ROLL the RIGHT Way with ROLLWAY



RIGHT ANGLE

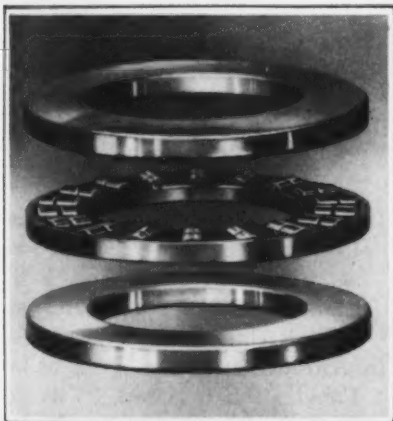
ROLLER ENDS, precisely square to avoid end-rub, oscillation and side-shock.

RIGHT ANGLE

BEARING SURFACES—parallelism that promotes unwavering rightline rolling.

RIGHT ANGLE

SEPARATOR SLOTS, accurately machined to prevent roller skew, slide and uneven wear.



In thrust bearings, too, the RIGHT ANGLE is better

Heavy thrust loads are carried best when the bearing is loaded at right angles to the roller surfaces. This feature of Rollway Thrust Bearings eliminates compound loads and complicated stress—promotes high efficiency and longer life.

Let's examine the bearing problems together to give you exactly the bearings you need. Our years of specialized bearing experience, plus complete engineering and metallurgical services are always available. No cost—no obligation. Just write or wire ROLLWAY BEARING CO., INC., SYRACUSE, N. Y.

ROLLWAY BEARINGS

Complete Line of Radial and Thrust Cylindrical Roller Bearings

SALES: Syracuse Boston Cleveland Philadelphia Pittsburgh Detroit
OFFICES: Chicago Birmingham Minneapolis Houston Los Angeles



CUT WIRE

The newest development in peening and blast cleaning abrasive, endorsed by leading metal working plants as an invaluable contribution to the industry.

It is most effective because it is absolutely uniform to start with, and the pellet size and mass remain uniform many passes longer.

Outlasts cast steel shot at least 2 to 1.



Licensed under
U. S. Patent No. 2184826
U. S. Application No. 619602

MALLEABLE

Shot, Grit

Our scientific heat treating makes it amazingly durable. It is stress relieved and there is practically no shattering.

Lasts at least twice as long as ordinary abrasive.

Exclusive screening process insures greatest uniformity in abrasives of this type.



- They improve blast cleaning and peening.
- They reduce freight and handling cost.
- They reduce equipment wear and maintenance from 50% to 75%.

We also manufacture Hard Iron Shot and Grit
—the top quality of its class.

The **CLEVELAND**
Metal Abrasive Co.

Main Office and Plant: 887 East 67th Street, Cleveland 8, Ohio
Howell Works—Howell, Michigan

METAL CONGRESS PROGRAM

Continued from Page 154

ler, F. W. Schonfeld, C. R. Tipton, Jr. and J. T. Waber, Los Alamos Scientific Lab.

Molybdenum Plating by Reduction of the Pentachloride Vapor, by W. J. Childs, J. E. Cline, W. M. Kisner and John Wulff, M. I. T.
Structure of Permanent Magnet Alloys, by A. H. Geisler, General Electric Co.

AWS—FLAME HARDENING

Commercial Flame Hardening, by E. J. Cox, Pittsburgh Commercial Heat Treating Co.

Flame Hardening of Large Surfaces, by J. J. Barry, Air Reduction Sales Co.

Production Flame Hardening, by Milton Garvin, Cincinnati Milling Machine Co.

AWS—ARCS, ELECTRODES & FLUXES

The Effect of Boron on Welds in Monel, by L. E. Stark and W. D. Forgeng, Union Carbide & Carbon Research Labs., Inc.

Effects of Reduced Atmospheric Pressures on the Characteristics of Arc Welding, by M. L. Begeman, B. H. Amstead and U. I. Mashruwala, Univ. of Texas.

Characteristics of Inert-Gas-Shielded Metal Arcs, by A. Muller and G. R. Rothschild, Air Reduction Co., Inc.

AWS—RESEARCH

Interrelation Between Mechanical Properties of Two Pressure Vessel Steels, by S. S. Tor, R. D. Stout and Bruce G. Johnston, Lehigh University.

Interpretation of the Work of the Fabrication Division, PVRC, by H. C. Boardman, Chicago Bridge & Iron Co.

Sub-Critical Heating of Low-Carbon Plate Steel, by L. J. Klingler, Case Institute.

AIME—RECRYSTALLIZATION AND ANNEALING TEXTURES

Activation Energy for Recrystallization in Rolled Copper, by B. F. Decker and D. Harker.

Recrystallization Reaction Kinetics and Texture Studies of a 50 Iron 50 Nickel Alloy, by W. E. Seymour and D. Harker.

Tough Machining Problems Solved with J&L Cold-Finished JALCASE 10

J&L STEEL



Maybe you haven't gotten the word yet, but more and more machinists are "discovering" Jalcas 10 (A.I.S.I. No. C-1144), the top grade of J&L Cold-finished Jalcas. And they're getting good results, too! Here's why.

Jalcas 10 is the highest carbon grade of Jalcas; it has high mechanical and machinability properties. This makes Jalcas 10 ideal for those tough "in between" machining applications. For instance:

Many times the finished-parts specifications on a job call for a high degree of hardness, but not as high as that obtained through heat-treating the finished part. In these applications, manufacturers and machinists have found it profitable to

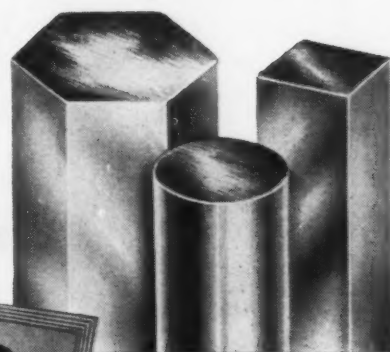
use Jalcas 10 and dispense with the heat-treating altogether.

This saves production time and cuts down on costs. And Jalcas 10's high quality produces a better finish. It's worth your while to try Jalcas 10 on your screw machines.

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From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY and JALLOY (hi-tensile steels).

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS



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You'll want more information about Jalcas 10 . . . and the other nine grades of Jalcas. Our booklet entitled "You Can Make Them Better with J & L Cold-finished Jalcas" contains information and technical data to help you produce better parts. This illustrated booklet is yours for the asking. Write today!

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Pittsburgh 30, Pennsylvania

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J&L Cold-Finished Jalcas".

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TITLE _____

COMPANY _____

ADDRESS _____

October 12, 1950

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C-O-TWO ANNOUNCES

Underwriters' Laboratories, Inc. Listed

Low Pressure Carbon Dioxide Type Fire Extinguishing Systems



**ECONOMICAL, EFFICIENT
FIRE PROTECTION**
from a single storage tank

C-O-TWO now adds another outstanding contribution to modern fire fighting . . . *C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems*. Carbon dioxide stored in bulk under low pressure, means greater fire protection for your larger size fire hazards at less cost.

Flexibility is the keynote of these new type C-O-TWO Fire Extinguishing Systems . . . the low pressure carbon dioxide storage tanks range in capacities from one to fifty tons, and can be operated as straight manual, partially automatic or fully automatic systems.

Flammable liquids, electrical equipment, storage and manufacturing processes can all be made firesafe from a single low pressure carbon dioxide storage tank. If fire strikes the system quickly goes into operation and the fast-acting, non-damaging carbon dioxide extinguishes the blaze in seconds.

COMPLETE CARBON DIOXIDE FIRE PROTECTION

With this new addition C-O-TWO offers complete, fully approved carbon dioxide fire protection . . . hand portables, wheeled portables, hose units, high pressure cylinder systems and low pressure storage tank systems. Whether your fire protection problem is a factory, mill, warehouse, power station or research center you have the assurance of the best type equipment for the particular fire hazard concerned.

Let an experienced C-O-TWO Fire Protection Engineer help you in planning up-to-date, fully approved fire protection now before fire strikes. Complete free information and descriptive literature available on request. Get the facts today!

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

METAL CONGRESS PROGRAM

Continued

The Textures of Cold-Rolled and Annealed Titanium, by H. T. Clark, Jr.

Relative Energies of Grain Boundaries in Silicon Iron, by C. G. Dunn, F. W. Daniels and M. J. Bolton.

Production and Examination of Zinc Crystals, by D. C. Jillson.

Recrystallization Textures in Aluminum, by Paul Beck and H. Hu.

AIME—STRUCTURE OF ALLOYS

Solid Solubility of Cementite in Alpha Iron, by C. A. Wert.

The Structure of Intermediate Phases in Alloys of Titanium with Iron, Cobalt and Nickel, by P. Duwez and J. L. Taylor.

The Alloys of Titanium with Carbon, Oxygen and Nitrogen, by R. I. Jaffee, H. R. Ogden and D. J. Maykuth.

Tuesday, Oct. 24

9:30 A.M.

ASM—HIGH TEMPERATURE METALLURGY

Transformations in Ferritic Chromium Steels Between 1100 and 1500°F (595 and 815°C), by F. J. Shortsleeve and M. E. Nicholson, Standard Oil Co.

Hardening of High-Chromium Steels by Sigma Phase Formation, by John J. Gilman, Crucible Steel Co. of America.

Nickel - Aluminum - Molybdenum Alloys for Service at Elevated Temperatures, by H. V. Kinsey, Dept. of Mines and Technical Surveys, and M. T. Stewart, National Research Council of Canada.

Sigma Phase Formation in a Wrought Heat Resisting Steel, by A. E. Bindari, Illinois Institute of Technology, P. K. Koh, Allegheny Ludlum Steel Corp., and Otto Zmeskal, Illinois Institute of Technology.

AWS—PIPE FABRICATION

Development of Welding Procedure for High Pressure, High Temperature Steam Piping, by N. L. Navarre, U. S. Naval Engineering Experiment Station.



HANGS IN THE BALANCE!

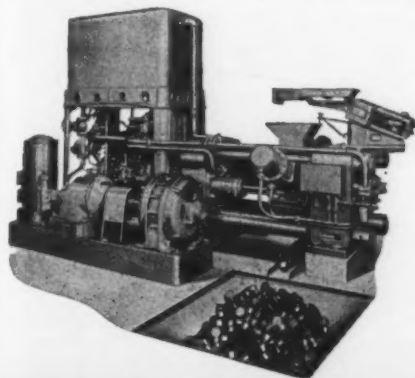
Convert Bulky Scrap into Profitable Briquettes

Balance between *profit* and *loss* in the reclamation of scrap lies in a MILWAUKEE Hydraulic Briquetting Press. Cast iron, steel, brass, magnesium, bronze, and aluminum turnings, borings, and chips can be converted into compact, uniform, solid cylindrical blocks quickly and easily with little or no loss. These briquettes, identical in size and weight, reduce scrap handling and storage problems to a minimum. Classified as high-grade scrap, briquettes can be charged into furnace or cupola more readily and with greater economy than loose scrap.

Leading manufacturers

of automobiles, heavy-duty mobile equipment, farm implements, aircraft, plumbing supplies, auto parts, pumps, and other high-production products currently are briquetting their scrap profitably. Many have increased self-sufficiency by reducing their dependence on outside scrap sources.

Of primary importance, also, is the fact that many of these plants have written off the *entire* cost of a MILWAUKEE Briquetting Press in one year or less. Write today for BULLETIN No. 117 to obtain complete specifications on available sizes of MILWAUKEE Briquetting Presses.



MILWAUKEE

CASTINGS ARE PERMANENT

Foundry Equipment Division

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Cleveland 5, Ohio



October 12, 1950

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LABORATORY-TESTED for consistent quality **SOL-SPEEDI-DRI**

SLIPPERY FLOORS VAMOOSE when you use Sol-Speedi-Dri. It's America's largest-selling oil and grease absorbent. For good reason: Pound for pound, price for price, you can't buy a better product. Production controls and selective mining are to that...and laboratory tests safeguard its consistent quality. Adequate warehouse stocks in cities throughout the country—speedy delivery everywhere. Standardize on Sol-Speedi-Dri!

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FREE SAMPLE: Fill out the coupon and mail today for this free sample.

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Address _____
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METAL CONGRESS PROGRAM

Continued

Fabrication and Welding of High Pressure-High Temperature Alloy Piping, by H. J. Irrgang, Jr., W. K. Mitchell & Co.

Submerged Arc Welding to Pipe Fabricating, by S. R. Joslin, Welding Engineering, Inc.

Design and Installation of Large Diameter, Long Span, Welded Pipe, by Horace Jackson, Thompson Pipe & Steel Co.

AWS—RESISTANCE WELDING

A Practical Method for Obtaining Consistent Resistance Welds, by J. W. Kehoe, Westinghouse Electric Corp.

Variables in Cross-Wire Welding Dissimilar Metals, by I. S. Goodman, Westinghouse Electric Corp.

Resistance Spot and Seam Welding of Aircraft Materials Using DC Current, by J. H. Cooper, Taylor-Winfield Corp.

The Projection Welding of 0.010- and 0.020-In. Steel Sheet, by E. F. Nippes, J. M. Gerken and J. G. Maciora, Rensselaer Polytechnic Institute.

AWS—SHIP STRUCTURE

Welded Reinforcement of Openings in Structural Steel Members, by D. Vasarhelyi and R. A. Hechtman, University of Washington.

The Determination of Initial Stresses and Results of Tests on Steel Plates, by Prof. E. W. Suppiger, Dr. Carlo Riparbelli and E. R. Ward, Princeton University.

Some Metallurgical Aspects of Ship Steel Quality, by H. M. Banta, R. H. Frazier and Dr. C. H. Lorig, Battelle Memorial Institute.

The Influence of Deoxidation Practice and Composition on the Toughness of Low-Carbon Steel, by J. F. Wallace, Watertown Arsenal.

SNT

Fluoroscopic Inspection on Light Metal Alloy Castings, by Justin G. Scheenman, X-Ray Products, and Tom Piper, Northrup Aircraft.



There's a place for Houghton in this picture

The gentleman is in conference — with himself. The time, we hope, is after 5:30. The place could be the office of any metallurgist who is thinking through to 1951.

Going through his mind in this after-hours thinking are the problems facing him in the near future — the need for increased production and how to meet it.

He's wondering, perhaps, how to speed up his heat treating, or how to get higher hardnesses, or how to eliminate distortion. He may be considering the greater use of salt as a heating medium . . . or obtaining of better drawing compounds for cold forming . . . or a more efficient coolant for machining, which will enable faster production.

Houghton can be—should be—in the picture. This service organization of ours attained its growth through the years solely

by rendering on-the-job aid to men like him. If the ideas are sound, our products naturally follow.

So when you're thinking ahead, put Houghton in the picture. Consider our 85 years of metal-working experience, our broad program of shirt-sleeved research, our personal plant help. When 1951 rolls around you'll be glad you did. E. F. Houghton & Co., Philadelphia and all principal cities.

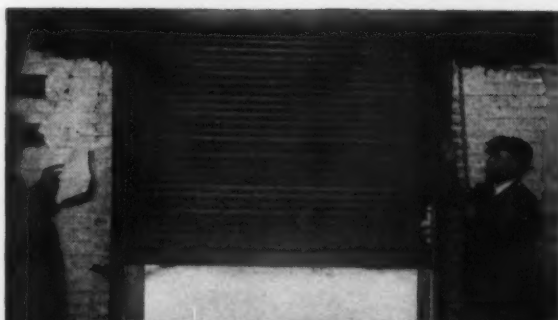
The Houghton Line of metal-working products:

Heat Treating Salts, Carburizers,
Quenching Oils, Cutting Oils, Rust
Preventives, Cleaners, Drawing Com-
pounds, Pickling Inhibitors, Lubricants.

Serving Industry Since 1865

47 YEARS OF SERVICE

and a few repairs make it ready for 47 more



The door at left has been in continuous service since 1903—for 47 years! The picture was taken this year, just before curtain slats were replaced and a few minor repairs made. In the photo below, the door is ready for many more years of efficient service and protection.



Another User Proves the Extra Value of
KINNEAR Steel Rolling Doors

You can find many similar records of long service for these famous doors in the Kinnear files—more proof that their interlocking steel-slat construction, *originated by Kinnear*, combines rugged durability and protection with smooth action and space-saving efficiency.

Kinnear Rolling Doors open straight upward and coil completely out of the way above the lintel. All surrounding floor, wall and ceiling space is fully usable at all times, because the doors need no extra room for opening and closing action.

When closed, these all-steel doors give an extra measure of protection against fire, theft, intrusion, wind and weather, or accidental damage.

Kinnear Rolling Doors, built to fit openings of any size, are easily installed in old or new buildings. Equipped for operation by hand-lift, chain, crank or electric motor. With Kinnear Motor Operators, they offer the added convenience of push-button control, plus remote controls at any number of points, if desired. Write today for complete information.

Saving Ways in Doorways
KINNEAR
ROLLING DOORS

The **KINNEAR MFG. COMPANY**
FACTORIES
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1742 Yosemite Ave. • San Francisco 24, Calif.
Offices and Agents in Principal Cities

METAL CONGRESS PROGRAM

Continued

Radiography Standards for Al and Mg Castings, by J. J. Pierce, Navy Ordnance Lab.

Correlation of X-Ray and Pressure Tests and Field Service on Non-ferrous Castings, by C. B. Johnson, Rockwell Mfg. Co., and S. A. Brosky, Pittsburgh Testing Laboratory.

AIME—TRANSFORMATIONS

On the Martensitic Transformation at Temperatures Approaching Absolute Zero, by S. A. Kulin and M. Cohen.

Austenite Formation During Tempering and Its Effects on Mechanical Properties, by E. F. Bailey and W. J. Harris, Jr.

The Isothermal Transformation of an Eutectoid Beryllium Bronze, by R. H. Fillnow and D. J. Mack.

The Ordering Reaction in Cobalt-Platinum Alloys, by J. B. Newkirk, A. H. Geisler, D. L. Martin and R. Smoluchowski.

AIME—PROPERTIES OF ALLOYS

The Effect of Alloying Elements on the Plastic Properties of Aluminum Alloys, by J. E. Dorn, P. Pietrokowsky and T. E. Tietz.

The Properties of Some Mg-Li Alloys Containing Al and Zn, by R. S. Busk, D. L. Leman and J. J. Casey.

The Effect of Sodium Contamination on Magnesium-Lithium Base Alloys, by P. D. Frost, J. H. Jackson, L. W. Eastwood, C. H. Lorig and A. C. Loonam.

Young's Modulus and Its Temperature Dependence in 36 to 52% Nickel-Iron Alloys, by M. E. Fine and W. C. Ellis.

2:00 P.M.

ASM—HIGH TEMPERATURE METALLURGY

Formation of Austenite in High Chromium Stainless Steels, by C. B. Post and W. S. Eberly, Carpenter Steel Co.

Influence of Austenitizing Time and Temperature on Austenite Grain Size of Steel, by O. O. Miller, U. S. Steel Corp.

Carbide Precipitation in AISI Type 304 Stainless Steel—An Electron Microscope Study, by



Inclusion-free high-carbon ferro chromium



assured by new process

Most ball and roller bearings must take terrific punishment in service, and their dependability is based directly upon the quality of steel from which they are made.

To meet the requirements of the bearing manufacturer and his customers, the steelmaker can rely upon our newly improved ferro chromium to help him produce consistently high grade bearing steels.

The high-carbon ferro chromium we have recently developed is exceptionally free from non-metallic inclusions, entrapped slag and dissolved gases. It is made by a new process* which includes filtering out harmful inclusions by pouring the metal, as tapped from the furnace, through a layer of molten slag of special composition. In addition to removing the undesirable inclusions, this process also assures greater density of the metal and the absence of shrinkage cavities in individual lumps.

High-carbon ferro chromium contains 66 to 70 per cent chromium, 4 to 6 per cent carbon, and 3 per cent maximum silicon.

Our technical staff will be glad to demonstrate to you the benefits to be gained in your steelmaking by the use of this improved high-carbon ferro chromium.

*Patented

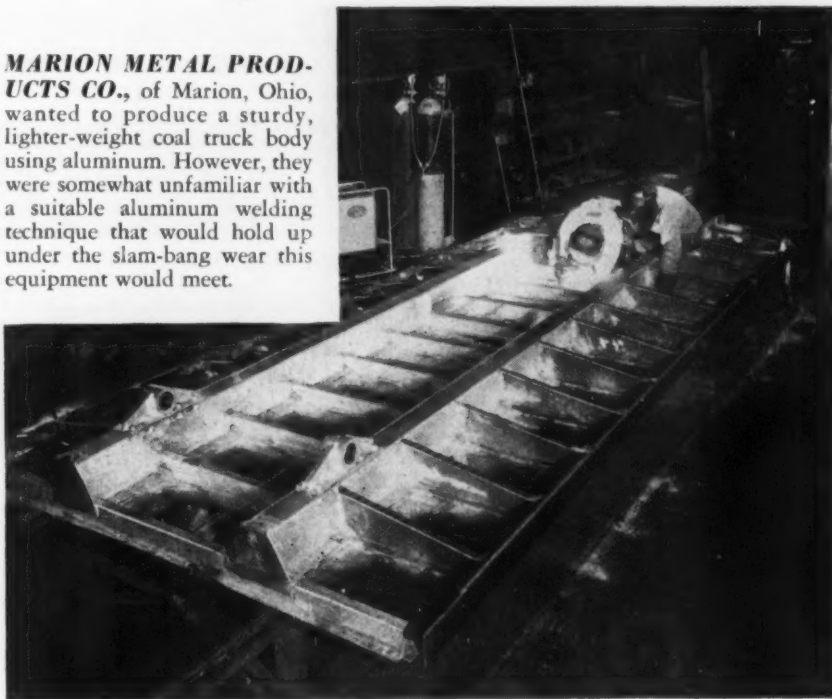


VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVE., NEW YORK 17, N. Y.
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New Aircomatic® Welding process permits building lighter coal truck ... with more payload

MARION METAL PRODUCTS CO., of Marion, Ohio, wanted to produce a sturdy, lighter-weight coal truck body using aluminum. However, they were somewhat unfamiliar with a suitable aluminum welding technique that would hold up under the slam-bang wear this equipment would meet.



Charles Bruno, Reynolds Metal Company's welding specialist, and Dana V. Wilcox, Airco technical sales service specialist were consulted and recommended to the customer the use of the new Aircomatic Process—an inert, gas-shielded arc welding method. Fabricated with the Aircomatic Process, the truck was found to be very rigid, even under full load ... and the total weight of the aluminum body was 2345 lbs. as against the former body weight of 4800 lbs. This tremendous decrease in body

weight permitted the loading of one more ton of coal ... a payload increase of 10%.

If you are interested in a fast and more economical effort of fabricating your products from aluminum, aluminum or silicon bronze, stainless and nickel clad steels, it will pay you to investigate the advantages of Aircomatic welding. For technical service or a copy of the Aircomatic welding bulletin ADC-661A, please write to your nearest Airco office.



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TECHNICAL SALES SERVICE—ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

METAL CONGRESS PROGRAM

Continued

E. M. Mahla and N. A. Nielsen,
E. I. du Pont de Nemours &
Co.

Some Aspects of Graphitization in Steel, by G. V. Smith, J. A. Mac-Millan and E. J. Dulis, U. S. Steel Corp.

AWS—RESISTANCE WELDING

Optimum Flash Welding Conditions—The Importance of Upset Variables, by Nippes, Savage, Patriarca, and McCarthy, Rensselaer Polytechnic Institute.

New Flash Welding Nonferrous Materials, by F. L. Brandt, Jr., Thomson Electric Welder Co.

Spot Welding of Scaly Heavy-Gage Structural Steel, by Nippes, Ramsey and Maciora, Rensselaer Polytechnic Institute.

AWS—DESIGN

Design for Production Economies, by G. F. Nordenholt, Product Engineering.

Organization for Design for Production Economy, by T. J. Crawford, Consulting Engineer.

Economies Accomplished by Redesign for Welding, by Kenneth Jackson, Caterpillar Tractor Co.

Applications of Welded Design for Cost Reduction, by R. H. Bennewitz, Linde Air Products Co.

AWS—SHIP STRUCTURE

The Underbead Crack Sensitivity of Some Shipbuilding Steels, by P. J. Rieppel and F. R. Baysinger, Battelle Memorial Institute.

Stress Studies of Welded Ship Structure Specimens, by Wm. R. Campbell, National Bureau of Standards.

The Distribution of the Locked-In Stresses in a Large Welded Steel Box Girder, by John Vasta, Bureau of Ships, Navy Dept.

SNT

Magnetic Particle Inspection of Welded Pipe and Tubing, by Clark - Peterson - Dunsheath, Magnaflux Corp.

Symposium on Magnetic Particle Testing.

IN CHICAGO AND NORTHERN ILLINOIS... Industries have Room to Grow



Decentralization and room to grow are two factors that have become important in considering plant location these days. In the Chicago and Northern Illinois area, you'll find the world's greatest facilities for both.

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beyond, the Chicago and Northern Illinois area offers the diversity to include the space you need.

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Just write us. We of course keep all such inquiries confidential.

Industries in the Chicago Area have these outstanding advantages: *Railroad Center of the United States • World Airport • Inland Waterways • Geographical Center of U. S. Population • Great Financial Center • The "Great Central Market" • Food Producing and Processing Center • Leader in Iron and Steel Manufacturing • Good Labor Relations Record • More Than 2,500,000 Kilowatts of Power • Tremendous Coal Reserves • Good Government • Good Living • Good Services for Local Tax Dollars.*

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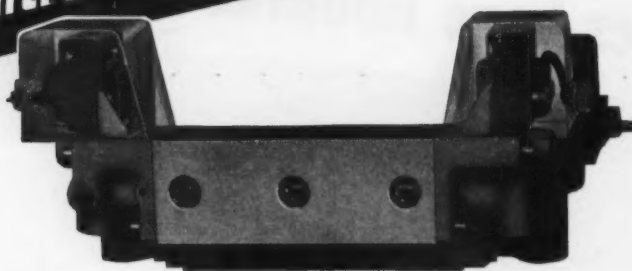
Marquette Building—140 South Dearborn Street, Chicago 3, Illinois—Phone RAndolph 6-1617

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October 12, 1950

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SIMPLIFIES electrical circuits

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There's a Quick-As-Wink Valve for **every** machine control requirement. Send for the data sheets. Get full details today!

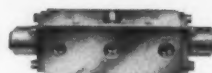
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Hand Operated Air Valves—wide variety of uses. 2-way, 3-way, 4-way neutral position and compound exhaust.



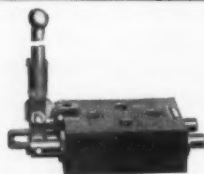
Foot Operated Air Valves—workman has both hands free, speeding production. 2-way, 3-way and 4-way actions.



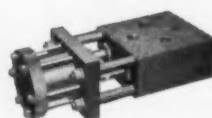
Single Plunger Valves—for air or low pressure hydraulic service. Lever, pilot, cam, diaphragm or solenoid operated. 2-way, 3-way, 4-way actions.



Series "O" and "OE" Valves—for air or hydraulic service up to 125 PSI. Push-pull, cam, pilot, diaphragm and solenoid operated. $\frac{1}{8}$ " and $\frac{1}{4}$ " pipe connections. 2-way, 3-way, 4-way and 5-way actions.



Hydraulic Valves—Up to 5000 PSI. Conservatively rated. $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1" and $1\frac{1}{2}$ " sizes. 2-way, 3-way, 4-way actions.



Hydraulic Valves—Up to 5000 PSI. Pilot cylinder operated. $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{2}$ ", 2", $2\frac{1}{2}$ ", 3" and 4" sizes. 2-way, 3-way, 4-way actions.

Quick-As-Wink Control Valves

Manufactured by **C. B. HUNT & SON, Inc.**

1915 East Pershing Street, Salem, Ohio



METAL CONGRESS PROGRAM

Continued

AIME—METAL—GAS REACTIONS

Equilibrium in the Reaction of Carbon Dioxide with Liquid Copper from 1090° to 1300°C, by D. J. Girardi and C. A. Siebert.

Hydrogen Solubility in Aluminum and Some Aluminum Alloys, by W. R. Opie and N. J. Grant.

The Vapor Pressure of Silver, by H. M. Schadel, Jr., and C. E. Birchenall.

Composition of Atmospheres Inert to Heated Carbon Steel, by R. W. Gurry.

The Intermittent Oxidation of Some Nickel-Chromium Base Alloys, by B. Lustman.

AIME—SOLIDIFICATION, THERMAL EXPANSION & DUCTILITY

Dendritic Crystallization of Alloys, by B. H. Alexander and F. N. Rhines.

The Supercooling of Aggregates of Small Metal Particles, by D. Turnbull.

The Thermal Expansion Characteristics of Beryllium, by R. M. Treco.

Thermal Expansion Characteristics of Stainless Steels Between 300° and 1000°, by D. E. Furman.

The Ductility of Cast Molybdenum, by R. B. Fischer and J. H. Jackson.

Correlation Between Electrical and Thermal Conductivity in Ni and Ni Alloys, by M. E. Fine.

8:00 P.M.

AWS—APPLIED WELDING ENGINEERING

A Symposium on Proper Application of Welding Processes

Introduction, by C. D. Evans, International Harvester Co.

Materials, by A. N. Kugler, Air Reduction Sales Co.

Design, by J. J. Chyle, A. O. Smith Corp.

Workmanship, by R. W. Clark, General Electric Co.

Inspection, by J. Lyell Wilson, Consulting Engineer.

SMT

Symposium on Radio-Isotopes, by Dr. G. H. Tenney, U. S. Atomic Energy Commission.

MACHINE TOOL BUILDER CUTS COSTS 26%

... increases rigidity with welded design

By James A. McCallum, Plant Superintendent
American Broach and Machine Company
Ann Arbor, Michigan

Heavier tool pressures, higher cutting speeds and closer work tolerances in modern machine tools require designs having greater inherent rigidity. In many cases, where the size and weight of a particular machine tool is limited, the increased strength must, of necessity, be gained through more efficient use of higher tensile metals. With welded construction, the engineer has at his command new freedoms of design, allowing him to place the right amount of metal in the right places and, at the same time, lower manufacturing costs by using less material, eliminating pattern expense and simplifying machining and assembly.

Typical benefits gained by converting machine tool designs to welded construction are illustrated in the fabrication of the main column for a vertical broach at the American Broach & Machine Company (Fig. 1). To eliminate the delays of preparing patterns and castings and speed delivery, upright members (Fig. 2-3) are now being fabricated by arc welding. Because of the uniform quality and thickness of the steel components, less metal needs to be machined from the fabricated assembly, cutting both shop time and tooling costs.

Savings in cost on the column member average 26% excluding an estimated cost of \$2000 for patterns that have been eliminated as well as one week's time for snagging and filling castings. By cutting 6,000 pounds from the weight, reduced shipping costs are helping to lower the prices quoted to our customers.



Fig. 1. Surface broach for the American Broach & Machine Company, Ann Arbor, Michigan. Capacity 40 tons, height 15½ feet, weight 34 tons.



Fig. 2. Greater rigidity with less weight. Welded steel is 3 times stronger, 2½ times stiffer than cast iron, saves 6,000 pounds of metal on this main upright column member.



Fig. 3. Modern streamline appearance. Component parts are cut and formed to shape before fast, simple downhand welded assembly.

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October 12, 1950

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NEW

for better welding
of high tensile steels

ARCOS TENSILEND

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These new Tensilend Electrodes have been developed and added to the Arcos low hydrogen family to help you overcome fabricating problems on high tensile steels. Tensilend 70 is the electrode that will fit the widest range of applications. Tensilend 100 and 120 provide unique properties to meet specialized requirements that can be met by no other electrodes.

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When welding low alloy or high carbon steels

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Stainless type coating controls hydrogen

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High ductility and impact strength

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One electrode welds high strength, low alloy steels, mild steel under highly restrained conditions, or sulphur-bearing free machining steels.

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Write for bulletin that will square you away on low hydrogen electrodes in simple question and answer form and tell how to get better welding of high tensile steels.

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Specialists in Stainless, Low Alloy and Non-Ferrous Electrodes



METAL CONGRESS PROGRAM

Continued

Wednesday, Oct. 25

9:30 A.M.

AWS—RESISTANCE WELDING

Development of Production Welding Techniques, by J. Raymond Wirt, General Motors Corp.

Spot Welding of Thin Materials with Short Time - Constant Equipment, by Franklin Page, Jr., Du Fresne & Page Engineering Co., and Frank Johnson, Unitek Corp.

Problems in the Design and Operation of Tube Mills for High-Speed Production, by Donald H. Fleig, American Electric Fusion Corp.

Contact Resistance, by Dr. W. B. Kouwenhoven, Johns Hopkins University.

AWS—EDUCATION

Viewpoint of Representative of Bureau of Ships, Navy Dept., by A. G. Bissell, Bureau of Ships, Navy Dept.

Viewpoint of Representative of Industrial Research, by J. Heuschkel, Westinghouse Electric Corp.

Viewpoint of Representative of Fabrication Industry, by J. J. Chyle, A. O. Smith Corp.

Viewpoint of Representative of Private Research, by Dr. J. M. Parks, Armour Research Foundation.

Viewpoint of Representative of a Western State University, by Prof. G. S. Schaller, University of Washington.

Viewpoint of Representative of an Eastern Private University, by Dr. G. E. Doan, Lehigh University.

Viewpoint of Representative of a Private Engineering School, by Prof. R. A. Wyant, Rensselaer Polytechnic Institute.

AWS—STRUCTURAL

Connections for Welded Rigid Portal Frames, by A. Anthony Topractsoglou, Lynn S. Beedle and Bruce G. Johnston, Lehigh University.

Stress Redistribution Above the

ELMES

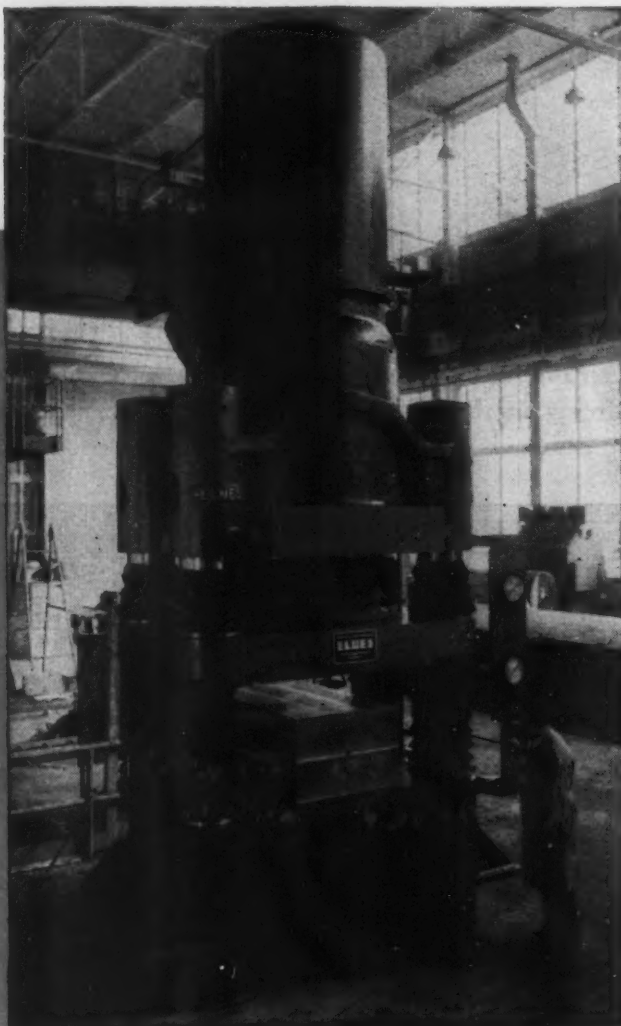
builds

- a wider range of hydraulic press types and sizes
 - with outstanding production economies
- in NEW Ultra-Modern Plant**

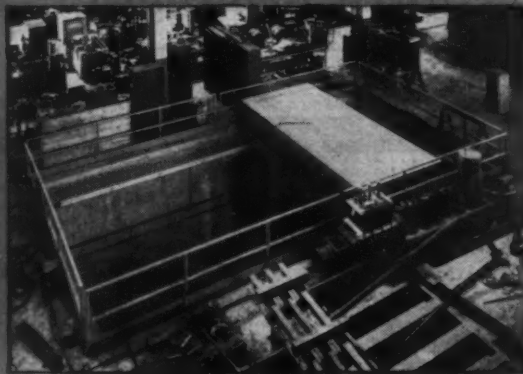
• In the large, modern plant shown below, equipped with the most advanced production facilities, Elmes is now building *much larger* presses and other hydraulic equipment in an *even wider range of types and sizes* than was possible before. And—with far greater economy. Now, more than ever, it will pay you to "Put Your Pressing Problems Up To Elmes."

You can't afford to keep outmoded machines on your payroll: they're too expensive—in low output, in high production and maintenance costs. Replacement with modern equipment is your BEST profit insurance. It will pay you to investigate the production potential of modern, high-efficiency Elmes Presses.

Aerial view of the new Elmes plant—one of the finest in the industry. The most modern precision production equipment and extensive working areas make possible the building of Elmes Hydraulic Presses in a greater variety of types and sizes, both standard and special designs.



▲ This 2000-ton Elmes Abrasive Wheel Forming Press is one of the first large units produced in Elmes' new plant. The press is lever-controlled with two pressures available. Rugged construction assures minimum deflection.



▲ A view of the new Elmes assembly pit for erecting presses of unusual height. Sectional pit covers permit simultaneous erection of several normal-height presses having sub-floor assemblies.

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METAL-WORKING PRESSES • PLASTIC-MOLDING PRESSES • EXTRUSION PRESSES • PUMPS • ACCUMULATORS • VALVES • ACCESSORIES

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FOLLANSBEE COLD ROLLED STRIP is furnished in continuous coils for direct feeding into automatics. This time-saving method of supplying material to stamping and forming machines is a big step toward increased production.

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METAL CONGRESS PROGRAM

Continued

Elastic Limit for a Welded Frame, by L. E. Grinter, Illinois Institute of Technology, and Charles G. Peller, Valparaiso University.

Buckling of Intermittently Supported Rectangular Plates, by Charles H. Norris, Massachusetts Institute of Technology.

Welded Eccentric Girders for Composite Bridge Construction, by R. E. Robertson, Saxe, Williar & Robertson.

2:00 P.M.

ASM—HEAT TREATMENT

A Hardenability Test for Deep Hardening Steels, by William Wilson, Jr., Armour Research Foundation.

An Examination of the Quenching Constant H, by D. J. Carney and A. J. Janulionis, Carnegie-Illinois Steel Corp.

The Tempering of Chromium Steels, by R. W. Balluffi, Sylvia Electric Products, Inc., Morris Cohen and B. L. Averbach, Massachusetts Institute of Technology.

Austenite Transformation, by Axel Hultgren, K. Tekniska Hogskolan.

SWT

Management's View Toward Non-Destructive Testing.

Place of Non-Destructive Testing in Metallurgist's Work.

Sonoscopy (Ultrasonic Image Visualization), by L. W. Ball, U. S. Navy Ordnance Lab.

AIME—RESEARCH IN PROGRESS

On the Temperature Dependence of Self-Diffusion in Alpha-Iron, by I. D. Bakalar.

Effect of Uniaxial Compressive Stresses on Self-Diffusion in Alpha-Iron, by F. S. Buffington.
Secondary Recrystallization of Silver, by F. D. Rosi.

Plastic Properties and the Extension of Silver Single Crystals, by F. D. Rosi.

On the Gamma (259) Planes Habit of Martensite, by E. S. Machlin.
The Transition Carbide in Tempered Martensite, by E. C. Roberts.



We're in the business of cutting gear costs—ALL ALONG THE LINE
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Sure we make all types of hobs, shaper cutters and miscellaneous gear tools; gear finishing machines (10 different models) for every kind and size of spur and helical internal and external gear. Sure we developed pre-shave hobs and cutters, Sine-Line gear and hob checkers (13 machines) plus Shear-Speed machines (4 sizes) to cut gears as fast as they can be finished.

But that's only part of the story. Tools and machines are like ingredients in a good stew. Each must be good, but you must also mix them correctly.

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... you can frequently **HOB AND SHAVE** a gear in **LESS TIME** than it takes just to hob it. You can also wind up with a lower **TOTAL** tool cost.

... you can cut total tool-change down-time with machines on which you change tools more often.

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... you can reduce cost of gear cutting by making a change in a different operation.

... you might get more output by cutting capital investment in new equipment by 80%.

... a different cutter width could easily cut shaving time in half.

Would you like to get your gear cutting tools "for nothing"?

... savings in re-grinding time can more than pay for the tools.

... raising your gear checking costs could cut over-all gear costs.

Impossible? They've all been done—many, time and again—by Michigan Tool engineers while cutting gear costs ALL ALONG THE LINE for somebody.

How much can we cut yours? Let's find out. Give us a ring or drop us a line.

MICHIGAN TOOL COMPANY 7171 E. McNichols Road
Detroit 12, U.S.A.

October 12, 1950

231

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 - Reduce Slipping Accidents
 - Improve Your Products



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METAL CONGRESS PROGRAM

Continued

AIME—POWDER METALLURGY

A Process for Hot Pressing Beryllium Powder, by A. U. Seybolt, R. M. Linsmayer and J. P. Frandsen.

The Densification of Prereduced Copper Powder Compacts in Vacuum and in Hydrogen, by C. B. Jordan and P. Duwez.

Experiments on the Mechanism of Sintering, by B. H. Alexander and R. Bulliffi.

Notes on the Powder Metallurgy of Zirconium, by H. H. Hausner, R. P. Angier and H. Kalish.

Studies on Control of Growth or Shrinkage of Iron-Copper Compacts During Sintering, by J. S. Kuzmick and E. N. Mazza.

8:00 P.M.

SMT

Symposium on Ultrasonics, by Dr. E. O. Dixon, Ladish Co.

Thursday, Oct. 26

9:30 A.M.

ASM—FRACTURE

Distribution of the Solute Element Between the Grain and Grain Boundary in Solid Solutions: The Mechanism of Temper Brittleness in Steel, by J. W. Spretnak and Rudolph Speiser, Ohio State University.

Effect of Strain Rate on Toughness of Temper Brittle Steel, by D. C. Buffum and L. D. Jaffe, Watertown Arsenal.

The Influence of Chromium on the Mechanical Properties of Plain Chromium Steels, by W. O. Binder and Howard R. Spendelow, Jr., Union Carbide & Carbon Res. Labs., Inc.

Rheotropic Embrittlement of Steel, by E. J. Ripling and W. M. Baldwin, Jr., Case Institute of Technology.

Embrittlement of Stainless Steels by Steam in Heat Treating Atmospheres, by C. A. Zapffe and R. L. Phebus, Research Metallurgists.

ASM—CONSTITUTION OF ALLOYS

The Ternary System Chromium-Molybdenum-Iron, by J. W. Put-

METAL CONGRESS PROGRAM

Continued

man, Massachusetts Institute of Tech.; R. D. Potter, University of California, and N. J. Grant, Massachusetts Institute of Tech.

The Ternary System Indium-Cadmium-Zinc, by S. C. Carapella, Jr., O'Brien Fellow, E. A. Peretti, University of Notre Dame.

The Determination of Solidus Temperatures in Magnesium Alloys by Dilatometric Measurements, by Heinrich Adenstedt, Wright-Patterson Air Force Base, Dayton, and Jay R. Burns, Dow Chemical Co.

Constitution and Mechanical Properties of Zirconium-Iron Alloys, by E. T. Hayes, A. H. Roberson and W. L. O'Brien, Bureau of Mines.

AWS—NONFERROUS METALS

Inert Arc Welding of Nonferrous Metals, by John W. Mortimer, Whitlock Mfg. Co.

The Effect of Welding on the Properties of Titanium-Carbon Alloys, by E. M. Mahla and R. B. Hitchcock, E. I. du Pont de Nemours & Co.

Aircomatic Welding of Copper-Base Alloys, by Harold Robinson and J. H. Berryman, Air Reduction Co., Inc.

Copper Alloy Brazing for Production Economy, by Clinton E. Swift and E. B. Brown, American Brass Co.

AWS—PRESSURE VESSELS

Stress Concentration Problems in Weld Construction at Atmospheric and Elevated Temperatures, by G. J. Green and D. H. Marlin, Dravo Corp.

Multiple Layer Submerged Arc Welding of Pressure Vessels, by L. C. Stiles and D. H. Curry, Chicago Bridge & Iron Co.

General Procedure for Fabrication of Pressure Vessels, by S. V. Williams, A. O. Smith Corp.

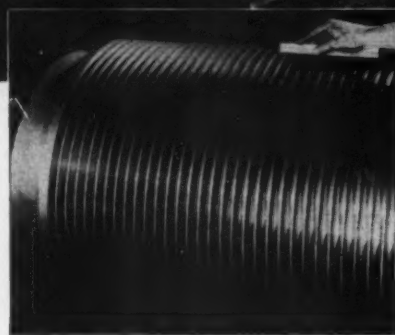
Welding of Stainless Steel Containers to Meet Sanitary Standards, by P. H. Mounts, Cherry-Burrell Corp.

AWS—AIRCRAFT

Heliarc Welding in Production, by T. E. Piper, Northrup Aircraft, Inc.

SHENANGO-PENN Centrifugal CASTINGS

... KEY TO SAVINGS



220-groove Fourdrinier wire cloth warp roll of alloy iron, shown during and after precision machining and grooving. Shenango-Penn centrifugal casting process gave highly desirable uniformity and extra strength to avoid distortion in service due to weight of roll and tension of warp wires.

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Weigh these money-saving facts!

MORE and more industries and suppliers are turning to Shenango-Penn for rolls and roll assemblies because...

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2. Shenango-Penn has the mod-

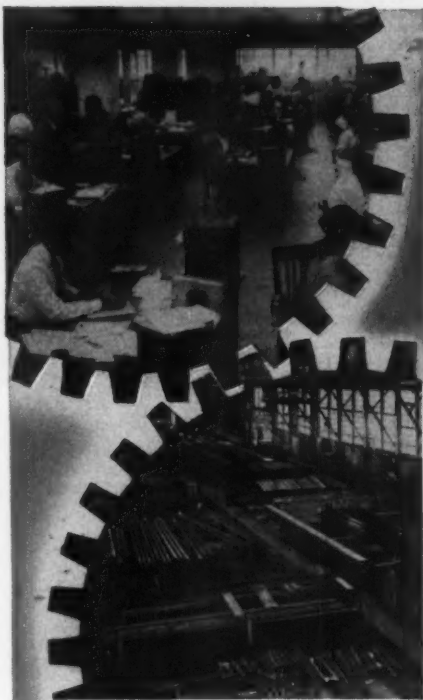
ern machining and finishing facilities, plus the years of specialized experience in producing quality rolls, that will meet your specifications with over-all precision. You save time and avoid trouble... both in installation and during subsequent use.

The big special roll shown and described above is one of the many varieties made by Shenango-Penn. For bulletins, for specific data on rolls or roll assemblies of any size or type, ferrous or non-ferrous, write to...

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Once again the Nation is confronted with an almost war-time emergency. Once again metals are difficult to procure. Here at Levinson our entire organization has already been geared to meet today's new problems. Conditions may have changed but Levinson's policy of close customer cooperation never changes. This means . . .

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20TH AND WHARTON-STS., S. S.
PITTSBURGH, PA.

Warehouse Aluminum & Steel Products

METAL CONGRESS PROGRAM

Continued

The Evaluation of Factors Influencing the Crack Sensitivity of Several Aircraft Steels, by A. W. Steinberger, B. J. De Simone and J. Stoop, Curtiss-Wright Corp.

Some Basic Problems in Design for Aircraft Welding, by J. Koziarski and K. B. Gillmore, Piasecki Helicopter Corp.

Jigs and Fixtures for Inert Gas Arc Welding, by H. A. Huff, Jr. and A. N. Kugler, Air Reduction Sales Co.

SMT

Supervoltage X-Rays in Industry and Radiological Defence.

Use of Betatron for Non-Destructive Testing, by Dr. G. D. Adams, University of Illinois.

Industrial Applications of Particle Radiations.

2:00 P.M.

ASM—FRACTURE

Fracturing of Silicon - Ferrite Crystals, by C. F. Tipper, Cambridge University, England, and M. Sullivan, Naval Res. Lab.

A Study of Cleavage Surfaces in Ferrite, by E. P. Klier, University of Maryland.

Fractographic Registrations of Fatigue, by C. A. Zapffe and C. O. Worden, Research Metallurgists.

Effect of Alloying Elements on Notch Toughness of Pearlitic Steels, by J. A. Rinebolt and W. J. Harris, Jr., Naval Research Lab.

Friday, Oct. 27

9:30 A.M.

ASM—PLASTICITY

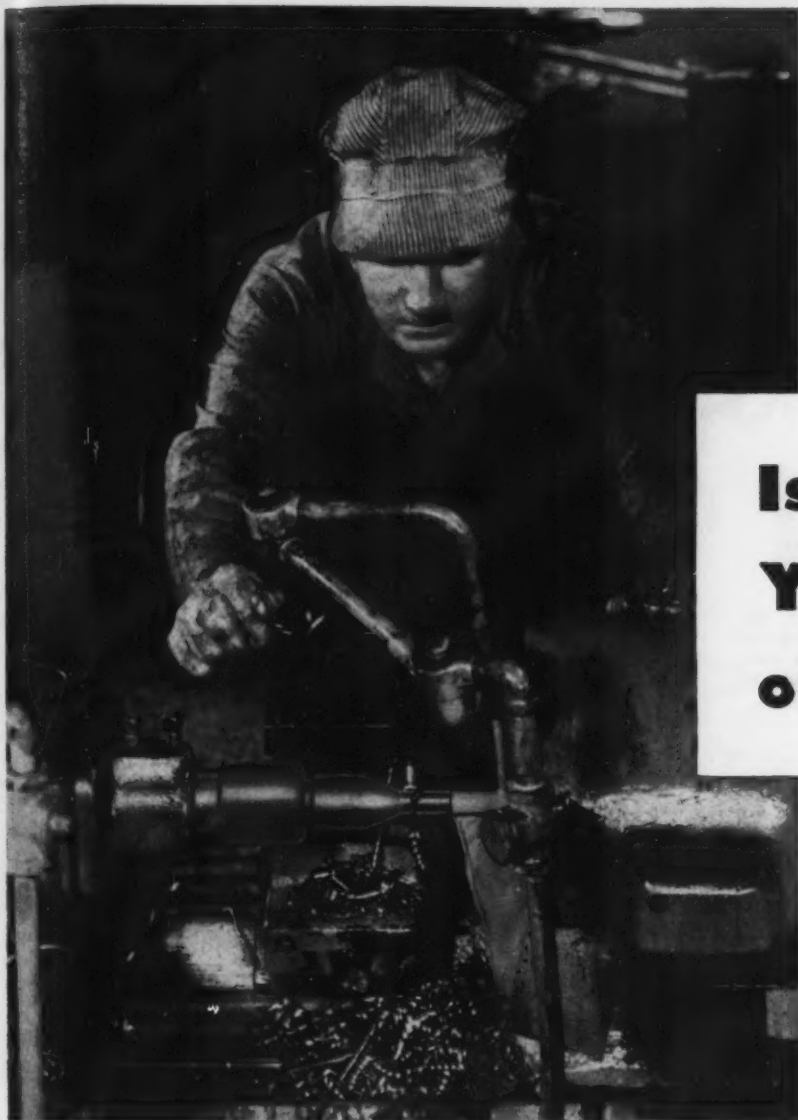
The Stress-Strain-Energy Relationship for Metals, by D. J. McAdam, Jr., Consulting Metallurgist.

Tension-Compression Biaxial Plastic Stress-Strain Relations for Aluminum Alloys 24S-T and 2S-O, by J. H. Faupel, E. I. du Pont de Nemours & Co., and Joseph Mari, Pennsylvania State College.

Hot Forming of Aluminum and Magnesium Alloys, by T. E. Piper, Northrup Aircraft, Inc.

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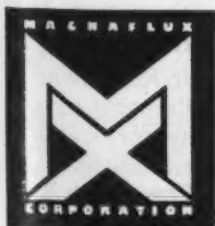


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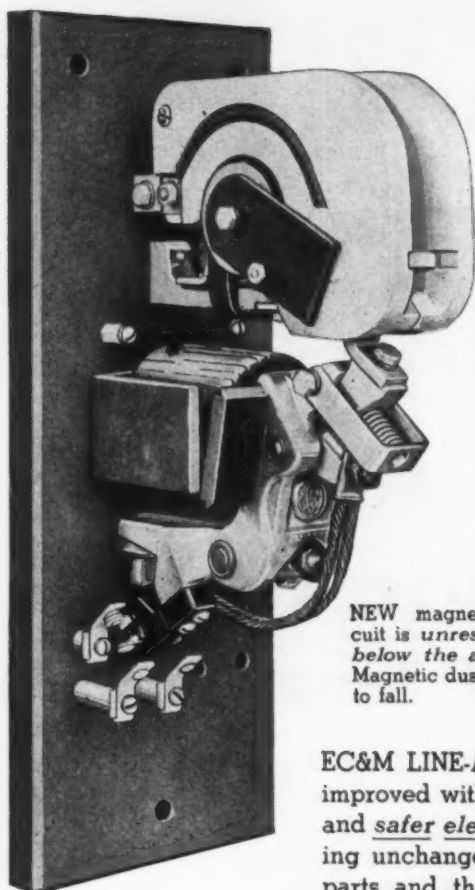
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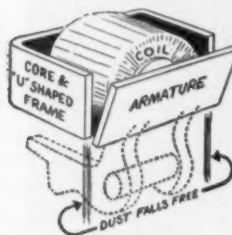


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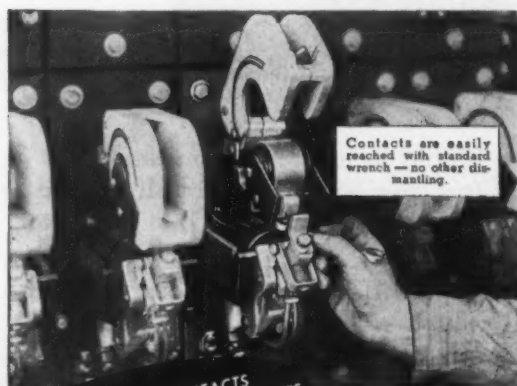
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METAL CONGRESS PROGRAM

Continued

Strain Hardening of Mild Steel in the Torsion Test as a Function of Temperature, by Hugh Larson, Massachusetts Institute of Technology, and E. P. Klier, University of Maryland.

ASM—PHYSICAL METALLURGY

The Powder Metallurgy of Beryllium, by H. H. Hausner and Norman P. Pinto, Sylvania Electric. **The Dimensional Behavior of Invar**, by B. S. Lement, University of Notre Dame, B. L. Averbach and Morris Cohen, M. I. T.

Preparation and Prospects of Titanium-Chromium Binary Alloys, by D. J. McPherson, Armour Research Foundation, and M. G. Fontana, Ohio State U.

The Relation of Carbon Manganese, Phosphorus, Silicon, Titanium and Molybdenum to Yield Strength, Tensile Strength and Elongation of Seamless Steel Tubes, by W. T. Rogers, National Tube Co.

Grindability of Tool Steels, by L. P. Tarasov, Norton Co.

AWS—INERT-GAS METAL-ARC WELDING

Aircomatic Welding of Nickel and Stainless Clad Alloys, by L. W. Williams, Lukens Steel Co.

Aircomatic Welding of Austenitic Nickel-Chromium Stainless Steel, by W. G. Benz, Jr. and J. S. Sohn, Air Reduction Co., Inc.

Argon Metal Arc Welding Nonferrous Metals and High- and Low-Alloy Steels, by H. T. Herbst, Linde Air Products Co.

Construction of Welded Aluminum Ammonium Nitrate Prilling Tower, by H. N. Hockensmith, Brown & Root, Inc.

AWS—OXYGEN CUTTING

The Use of Electronically Guided Template Tracing Devices in Shape Flame Cutting, by R. O. Fish, Fairbanks, Morse & Co.

Foundry Applications for Oxygen Acetylene and Other Gases, by G. E. Bellew, Air Reduction.

Production Edge-Preparation and Shaping of Plate for Welding, by C. A. Heffernon, Linde.

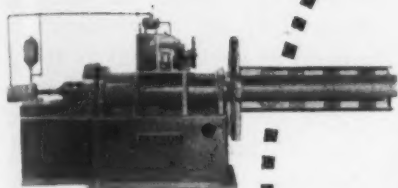
Design Around a Process, by R. F. Helmkamp, Air Reduction.

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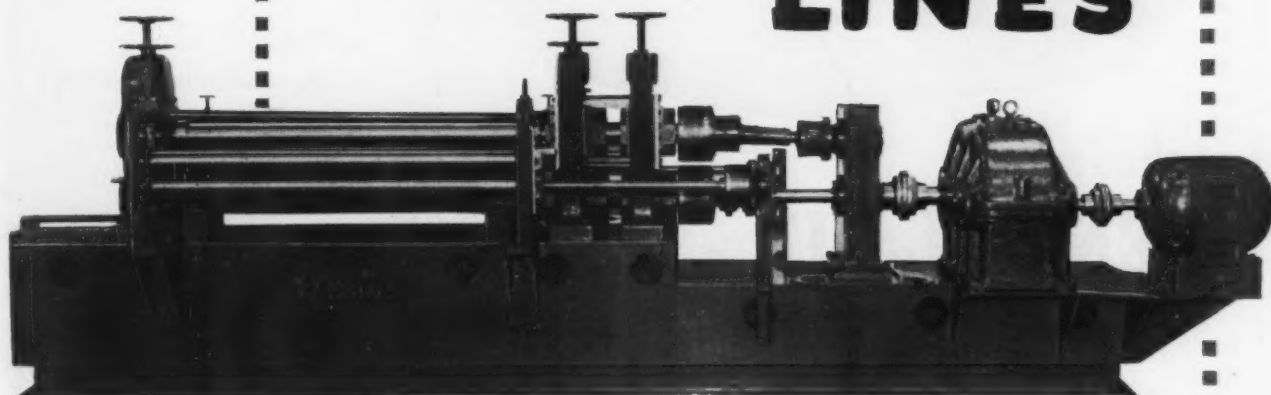
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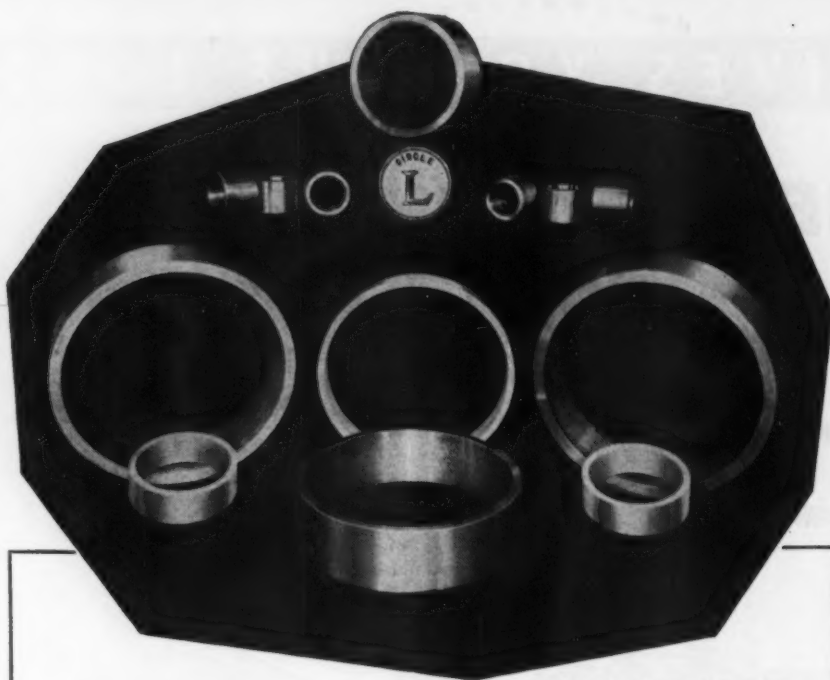
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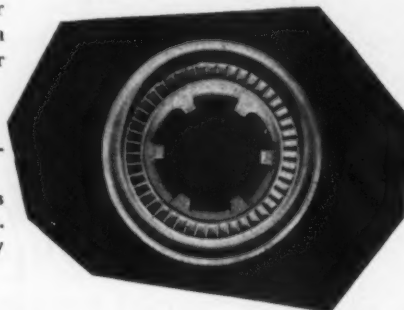
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METAL CONGRESS PROGRAM

(Continued)

AWS—LOCOMOTIVES AND RAILROADS

Fabrication of Main Line and Switcher Locomotives, by Fred T. Perry, General Electric Co.

Reclamation of Diesel Locomotive Parts, by LaMotte Grover, and R. L. Rex, Air Reduction Co.

Economy of Reclamation by Welding at the Railroad Reclamation Plant, by W. G. Muschler, Chicago, Burlington & Quincy R. R.

Rehabilitation of Ore Cars, by J. F. Likarish, Great Northern Railway Co.

2:00 P.M.

AWS—MACHINERY AND MAINTENANCE

Welding as Applied to Manufacture of Farm Tractors, by J. L. Buchholz, International Harvester Co.

Tubular Sections in Frame Design of Hydraulic Benders, by E. J. DeWitt, Wallace Supplies Mfg. Co.

Electric Utility Welding in the Shop and Field, by David P. O'Connor, Dept. of Water and Power, City of Los Angeles.

AWS—CONTROLS, STANDARDS

Procedure Approval Tests, by S. S. Katsef, U. S. Naval Engineering Experiment Station.

Better Welding at Lower Costs, by Lew Gilbert, Industry and Welding.

Suggested New Welding Standards, by J. F. Lincoln, Lincoln Electric Co.

AWS—MACHINE WELDING

Welding with the Multiple Electrodes in Series—a New Union-melt Method, by E. L. Frost, Union Carbide & Carbon Research Labs., Inc.

Welding Characteristics of Submerged Arc with Three-Phase Power, by N. G. Schreiner Linde Air Products Co., and E. A. Clapp, Union Carbide & Carbon Research Labs., Inc.

Automatic Welding in Steel Mill Maintenance, by W. P. Hoffman, International Harvester Co.

Resume Your Reading on Page 155



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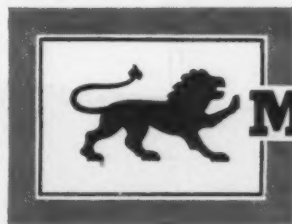
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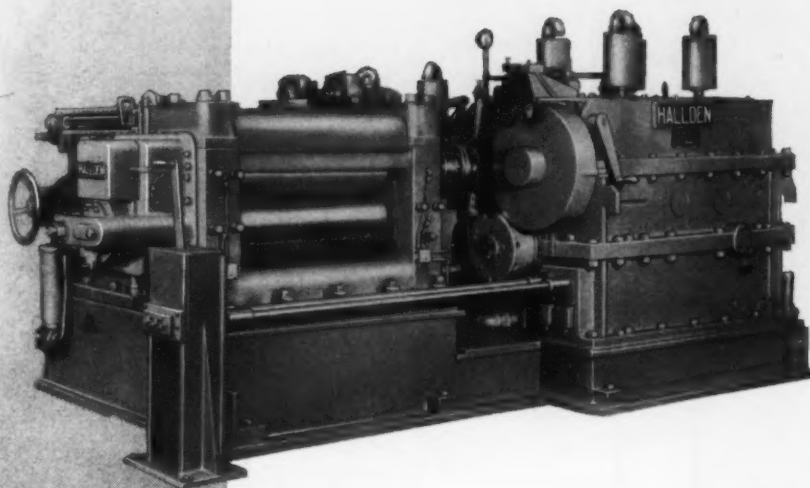
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METAL SHOW EXHIBITORS

Continued from Page 178

- cago. New and rebuilt machinery, equipment. Booth 1206.
- Ipsen Industries, Inc., Rockford, Ill. Automatic heat treating unit, endothermic generator. Booth 715.
- Iron Age, The. Booth 826.
- Jarrell-Ash Co., Boston, Mass. Spectrochemical installations, X-ray diffraction unit. Booth 129.
- Jensen Specialties, Inc., Detroit 27. Infra red ovens. Booth 2527.
- S. C. Johnson & Son, Inc., Racine, Wis. Corrosion inhibiting wax. Booth 2544.
- C. Walker Jones Co., Philadelphia 38. Industrial work gloves, heat and flame resistant gloves. Booth 2121.
- Kalamazoo Tank & Silo Co., Kalamazoo, Mich. Metal cutting band saw machines. Booth 1210.
- Kanthal, A. B., Hallstahammar, Sweden. Heating equipment. Booth 2428.
- Kellog Division, Rochester 9, N. Y. (See American Brake Shoe Co.) Booth 2024.
- C. M. Kemp Mfg. Co., Baltimore, Md. Burners, heating units, control equipment. Booth 920.
- Kennametal, Inc., Latrobe, Pa. Titanium carbide high temperature alloy, Kennametal tools. Booth 808.
- Andrew King, Narberth, Pa. Portable Brinell hardness testers, microscope. Booth 706.
- Kold-Hold Mfg. Co., Lansing 4, Mich. Refrigeration truck units, locker plant shelves, stands. Booth 2208.
- Kux Machine Co., Chicago 24. Die casting machines, powdered metal press. Booth 2212.
- Laboratory Equipment Corp., St. Joseph, Mich. HF induction furnace. Booth 2726.
- Lapeer Manufacturing Co., Detroit 16. Toggle-action clamps, cylinders, wrenches. Booth 2453.
- Leeds & Northrup Co., Philadelphia 44. Furnace temperature, air-fuel ratio and draft control, carburizing furnace and automatic controls. Booth 1624.
- Lempco Products, Inc., Bedford, Ohio. Grinders and shop equipment. Booth 2460.
- Lepel High Frequency Lab., Inc., New York. Bench model, larger HF induction heating units. Booth 2221.
- Leslie Welding Co., Chicago 12. Hand punch press, contract welding facilities. Booth 2741.
- Lewis Machine Co., Cleveland. Travel-cut wire straightening and cutting machine, short-cut wire straightening and cutting machine. Booth 2610.
- Lincoln Electric Co., Cleveland 1. High density semi-automatic welder, manual welder and equipment. Booth 1201.
- Lindberg Engineering Co., Chicago 12. HF heating units and dry cyaniding equipment. Booth 1204.
- Lindberg Steel Treating Co., Chicago, Ill. Heat treating service. Booth 2015.
- Linde Air Products Co., New York 17. Unionmelt, argon arc, oxyacetylene and Heliarc welding. Booths 901, 1001, 1101.



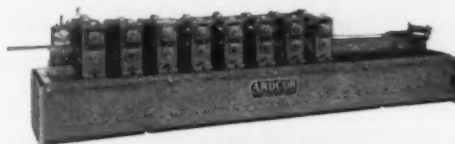
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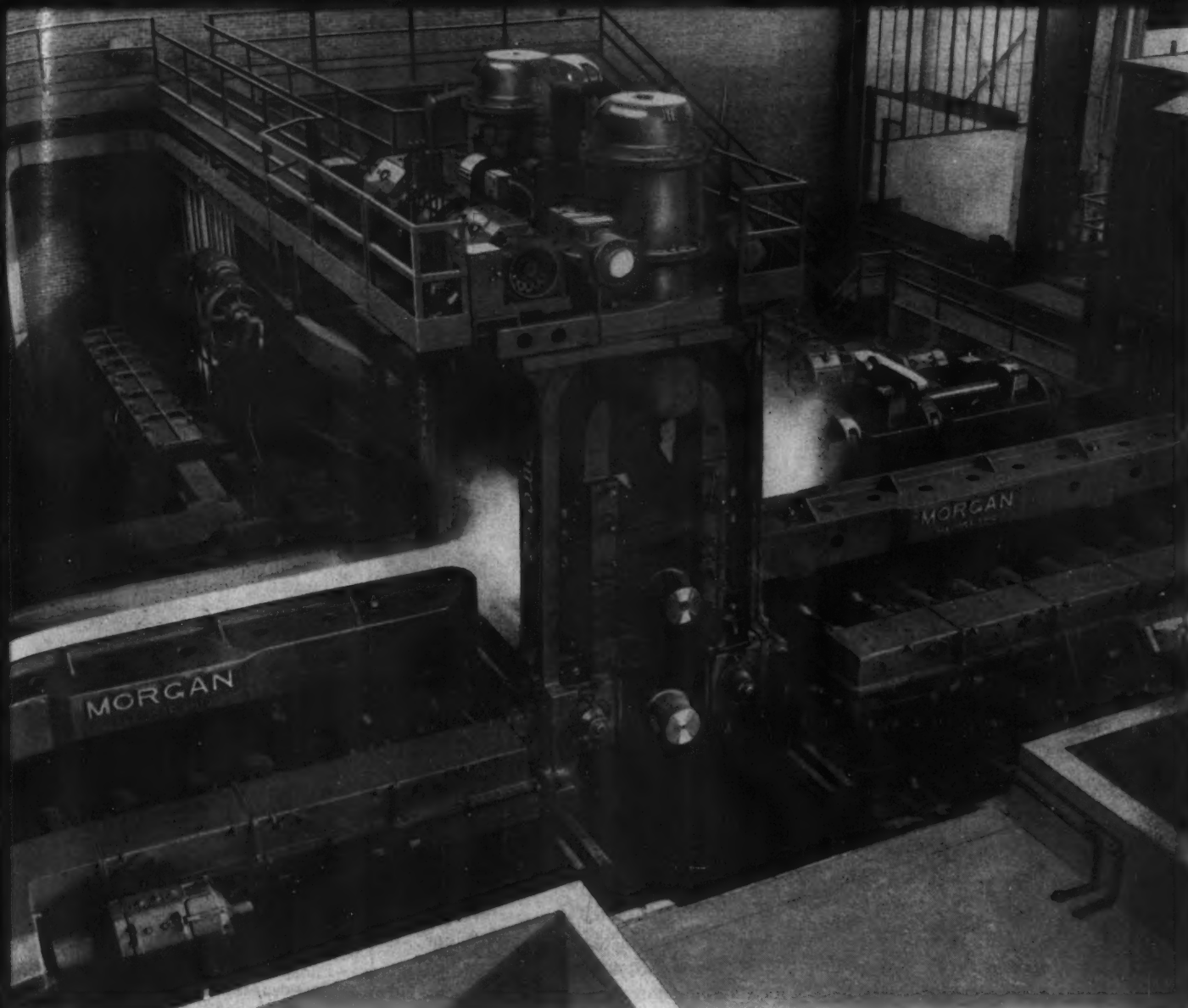
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METAL SHOW EXHIBITORS

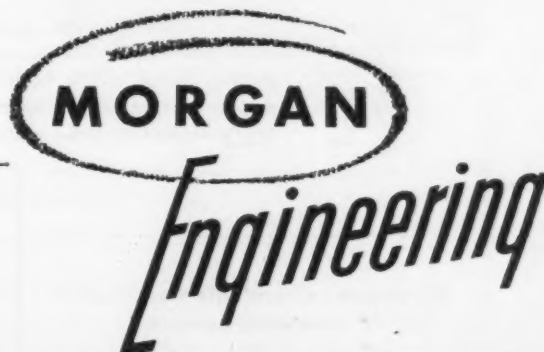
(Continued)

- Lipe-Rollway Corp.**, Syracuse, N. Y. Booth 2549.
- Liquid Carbonic Corp.**, Chicago 23. Gasweld equipment, supplies. Booth 1815.
- Lithium Co.**, Newark 4, N. J. Lithium atmosphere heat treating and forging furnaces. Booth 2719.
- Lord Mfg. Co.**, Erie, Pa. Vibration-control mountings. Booth 1807.
- Los Angeles Chamber of Commerce**, Los Angeles. Booth 815.
- Los Angeles Dept. of Water & Power**, Los Angeles. Booth 815.
- Lukens Steel Co.**, Coatesville, Pa. Steel, plates, heads, steel plate shapes, and clad steels. Booth 1625.
- Lynchburg Foundry Co.**, Lynchburg, Va. Castings, foundry facilities. Booth 2517.
- Magnaflux Corp.**, Chicago 31. Magnetic inspection machinery and equipment. Booth 2012.
- Magnetic Analysis Corp.**, New York. Magnetic inspection equipment for testing of ferrous and non-ferrous materials and parts. Booth 1920.
- Makepeace Co.**, Attleboro, Mass. Gold and silver rolled plate, sheets, tubing and wire. Booth 1712.
- Manhattan Rubber Mfg. Div.**, Passaic 2, N. J. Foundry cut-off wheels, moldisc for rotary sanders, diamond wheels for cemented carbides. Booth 2130.
- Martindale Electric Co.**, Cleveland 7. Rotary files and burs, circular metal cutting saws, electrical testing instruments, protective dust mask. Booth 1811.
- Martin Wells, Inc.**, Los Angeles. Electrode holders, valve seat inserts. Booth 2541.
- Master Builders Co.**, Cleveland 3. Non-shrink metallic aggregate, iron-clad industrial floors. Booth 2547.
- Merrill Bros.**, Maspeth, N. Y. Plate lifting plant. Booth 416.
- Metal Lubricants Co.** Booth 2720.
- Metal Parts & Equipment Co.**, Chicago. Booth 1514.
- Metal Products Sales Co.**, West Hartford, Conn. Booth 2415.
- Michiana Products Corp.**, Michigan City, Ind. Stainless, heat resistant and abrasion resistant castings. Booth 2618.
- Miller Electric Mfg. Co.**, Appleton, Wis. "Heliarc" welders, welder-power plant combination, spot and dc welders. Booth 2448.
- A. Milne & Co.**, New York. Tool steels and applications for tool steels, cold drawn sections. Booth 2448.
- Minneapolis-Honeywell Reg. Co.**, Minneapolis 8, Minn. Electric, pneumatic and electronic controls, valves, mercury switches, motors. Booth 1802.
- Mir-O-Col Alloy Co.**, Los Angeles 31. Hard facing metals and ferro-alloy castings. Booth 1514.
- Morganite, Inc.**, Long Island City, N. Y. Pure oxide refractory ware, tubes, sheaths. Booth 2737.
- Morton Gregory Corp.**, Toledo, Ohio. Welding studs. Booth 2559.
- National Bearing Div.**, St. Louis, Mo. Bronze cored solid bar stock, babbitt metal, bronze and aluminum castings. Booth 2024.



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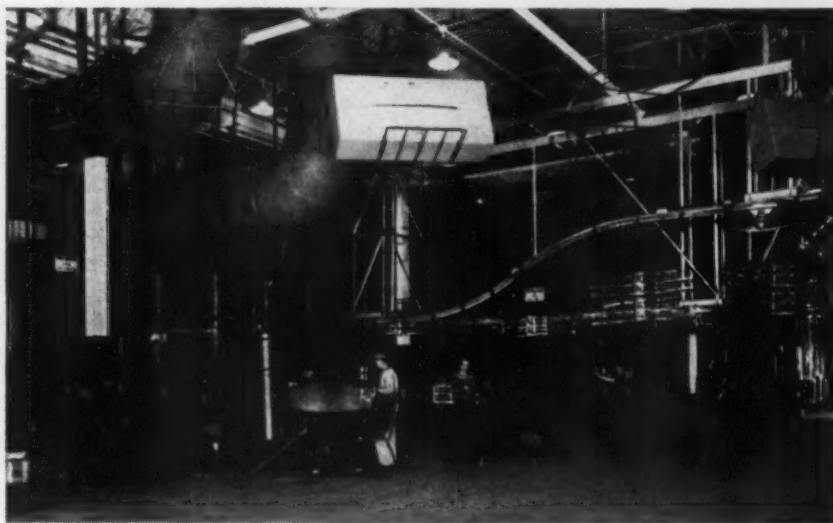
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METAL SHOW EXHIBITORS

(Continued)

National Carbon Co., Div. of Union Carbide & Carbon Corp., N. Y. Graphite ingot stool inserts, furnace electrodes, brushes, carbon brick, heat exchangers. Booth 901.

National Cored Forgings Co., Inc., New York. Forgings. Booth 2123.

National Diamond Laboratory, New York 7. Industrial diamond tools, hones, production cluster tools and diamond mounted quill wheels. Booth 2447.

National Lead Co., New York, N. Y. Lead primary products and end products. Booth 1917.

National Radiator Co., Johnstown, Pa. Iron powder, nickel, manganese and silicon powders. Booth 414.

National Research Corp., Cambridge, Mass. Vacuum furnace, vacuum equipment and vacuum treated metals. Booth 1816.

National Spectrographic Laboratories, Inc., Cleveland 3. Spectrographic equipment and supplies. Booth 129.

Navy, Dept. of, Washington, D. C. Booth 2903.

Nelson Stud Welding Div., Lorain, Ohio. Stud welder, stud welding power and battery units. Booth 2559.

New Jersey Zinc Co., New York 7. Zinc die castings, pressed powder parts of brass, bronze and nickel silver. Booth 2103.

North American Phillips Co., N. Y. Geiger counter spectrometer, diffusion generator, fluorescent analysis and nuclear research equipment. Booth 528.

Nox-Rust Chemical Corp., Chicago 8. Rust preventative paper and compounds. Booth 2643.

Oakite Products, Inc., New York 6. Phosphate coating process, metal cleaners and conditioners. Booth 322.

Ohio Crankshaft Co., Cleveland 1. New H F induction heating set, mg set, master heating station. Booth 910.

Ohio Seamless Tube Co., Shelby Ohio. Seamless and electric welded steel tubing, fabrication and forging. Booth 109.

Olin Industries, Inc., East Alton, Ill. Brass products, explosives, electrical equipment. Booth 2502.

Olsen Testing Machine Co., Willow Grove, Pa. Universal testing machine, cap 200,000 lb, 12,000 testing machine, new model high magnification recorder and control equipment. Booth 629.

O'Neil-Irwin Mfg. Co., Lake City, Minn. Sheet metal working machinery. Booth 1603.

Optimus Equipment Co., Matawan, N. J. Washing, rinsing, pickling, and drying equipment. Booth 1732.

Osborn Mfg. Co., Cleveland 14. New gear deburring method, sheet steel scrubbing and other brushes. Booth 319.

Ozalid Div., General Aniline & Film Corp., Johnson City, N. Y. Ozalid Printmaster, products for dry process printmaking. Booth 1527.

Pangborn Corp., Hagerstown, Md. Liquid blast and portable blast machines, Hydro-Finish and soft abrasive blast cleaning machines. Booth 2560.

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- **For steel castings repair:** matches analysis and heat-treating properties of Grade B castings... P&H25C.
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- **For chrome-moly steels (1% Cr., 1/2% Mo.)** used in power piping... 80LE.
- **For chrome-moly steels (2% Cr., 1% Mo.)** used in power piping... 90LE.
- **To match heat-treating properties of SAE 1040 and like steels.** Also for steel-castings repair... P&H40C.
- **For welding high hardenable steels.** Also steel castings repair... AW2B.
- **For repair welding Grade C castings** and steels of similar composition... P&H#7.
- **Comparable to SAE 8630 steel...** excellent heat-treating and flame-hardening characteristics... 90LH#2.
- **For welding high hardenable steels** without preheat such as re-rolled rail stock... P&H#12.
- **For aircraft and similar steels...** has wide range of properties under heat treatments... P&H#21.



Withstand high amperages and have high deposition rate. Operators burn more rod per hour, weld faster at lower costs.



P&H

**WELDING
DIVISION**

Milwaukee 14, Wis.

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HARNISCHFEGER CORPORATION, Welding Division
4401 W. National Ave., Milwaukee 14, Wis.

Please send me complete information on money-saving P&H Low-Hydrogen Electrodes.

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Company..... Title.....

Address..... Home ☐ Business ☐

City..... (.....) State.....

EXCAVATORS • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZER • CRAWLER AND TRUCK CRANES
• DIESEL ENGINES • CANE LOADERS • PRE-ASSEMBLED HOMES

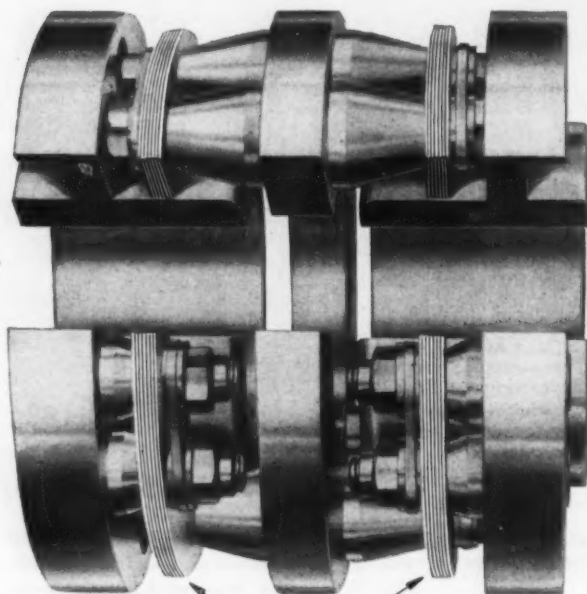
THOMAS *Flexible* ALL METAL COUPLINGS

FOR POWER TRANSMISSION • REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes: ½ to 40,000 HP — 1 to 30,000 RPM.

Specialists on Couplings for more than 30 years



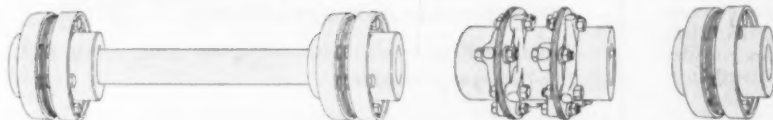
PATENTED FLEXIBLE DISC RINGS

**BACKLASH
FRICTION
WEAR and
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are eliminated
LUBRICATION IS
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THE THOMAS PRINCIPLE GUARANTEES
PERFECT BALANCE UNDER ALL
CONDITIONS OF MISALIGNMENT.

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NO MAINTENANCE PROBLEMS.

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ALL PARTS ARE
SOLIDLY BOLTED TOGETHER.



Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

METAL SHOW EXHIBITORS

(Continued)

- Park Chemical Co., Detroit 4. Platers' and polishers' supplies, heat treating and tempering salts and oils. Booth 1202.
- Parker-Kalon Corp., New York 14. Complete line of hardened self-tapping screws. Booth 2418.
- Partlow Corp., New Hartford, N. Y. Temperature controls and recorders. Booth 818.
- C. F. Pease Co., Chicago 18. Automatic whiteprinting machine. Booth 2228.
- Phillips Mfg. Co., Chicago 45. Degreasers, metal washers. Booth 2031.
- Physicists Research Co., Ann Arbor, Mich. Profilometer for shop measurement of surface roughness. Booth 2566.
- Pines Engineering Co., Aurora, Ill. Variable radii contour bender, automatic, semi automatic benders, tube burring machines. Booth 2410.
- Plastic Metals Div., The National Radiator Co., Johnstown, Pa. Iron, nickel, manganese and silicon powders and parts. Booth 414.
- Powdered Metal Products Corp. of America, Franklin Park, Ill. Spur, helical, bevel, and cluster gears, powdered metal parts. Booth 2642.
- Precision Extrusions, Bensenville, Ill. Booth 2424.
- Precision Shapes Inc., Suffern, N. Y. Continuous-milled metal parts. Booth 2524.
- Precision Welder & Machine Machine Co., Cincinnati 10. Resistance welding machines. Booth 429.
- Pressco Castings & Mfg. Co., Chicago 3. Pressure die and permanent mold castings, powder parts, stampings. Booth 1715.
- Pressed Metal Institute, Cleveland 20. Booth 2445.
- Product Engineering, Inc., Detroit, Mich. Special machinery & tool and die designers. Booth 1504.
- Production Machine Co., Greenfield, Mass. Centerless Polishing Machines. Booth 1817.
- Pyrometer Instrument Co., Inc., Bergenfield, N. J. Pyro Micro-Optical pyrometers, optical, bi-optical, radiation, surface, immersion and indicating pyrometers. Booth 302.
- Radio Corp. of America, New York 1. Table model electron microscope, soldering of cans. Booth 514.
- R. C. A., Victor Div., Camden, N. J. Electron micrograph. Booth 514.
- Rapids-Standard Co., Grand Rapids, Mich. Materials handling equipment, conveyors, hand trucks. Booth 2457.
- Ransome Div., Dunellen, N. J. (See Worthington Pump and Machinery Corp.) Booth 506.
- Raybestos-Manhattan, Inc., Passaic, N. J. (See Manhattan Rubber Div.) Booth 2130.
- Raytheon Mfg. Co., Waltham, Mass. Bench welding equipment for metals. Booth 2548.
- Reeves Pulley Co., Columbus, Ind. Pulleys. Booth 2020.
- Revere Copper & Brass, Inc., New York 17. Copper, copper alloys and aluminum. Booth 108.
- Reynolds Metals Co., Louisville, Ky. Aluminum primary products and end products. Booth 1211.

UNIVERSAL-CYCLOPS STEEL CORP.

reports uniform cleaning of steel products with the
DU PONT SODIUM HYDRIDE DESCALING PROCESS



Stainless, high-speed, alloy and carbon steels handled with savings in time and materials.

In December 1945, the Universal-Cyclops Steel Corporation installed a Du Pont Sodium Hydride Descaling Bath in its plant at Bridgeville, Pennsylvania.

Designed to descale up to five tons per hour, the bath is used to clean quickly and uniformly Universal-Cyclops' production of stainless steel sheet, wire and strip; high-speed steel sheet and wire products; and alloy and carbon steel sheet, wire and strip. Installation of the

Du Pont Sodium Hydride Descaling Process has resulted in savings in acid, metal, and operating time. In addition, the tendency of the sheet, wire and strip to "smut up" after acid treatment has been virtually eliminated.

Because of the excellent results obtained with the first unit, Universal-Cyclops installed a second bath in July 1946 to clean wire and rod in coils. Such "second installation" proof of satisfaction is common in plants operating Du Pont Sodium Hydride Descaling Baths.

Mail the coupon below. It will bring you a booklet describing the process and an offer of technical assistance in planning a unit for your plant.



Tune in Du Pont "Cavalcade of America" Tuesday nights—NBC coast to coast

DU PONT
Sodium hydride process
for positive descaling



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department
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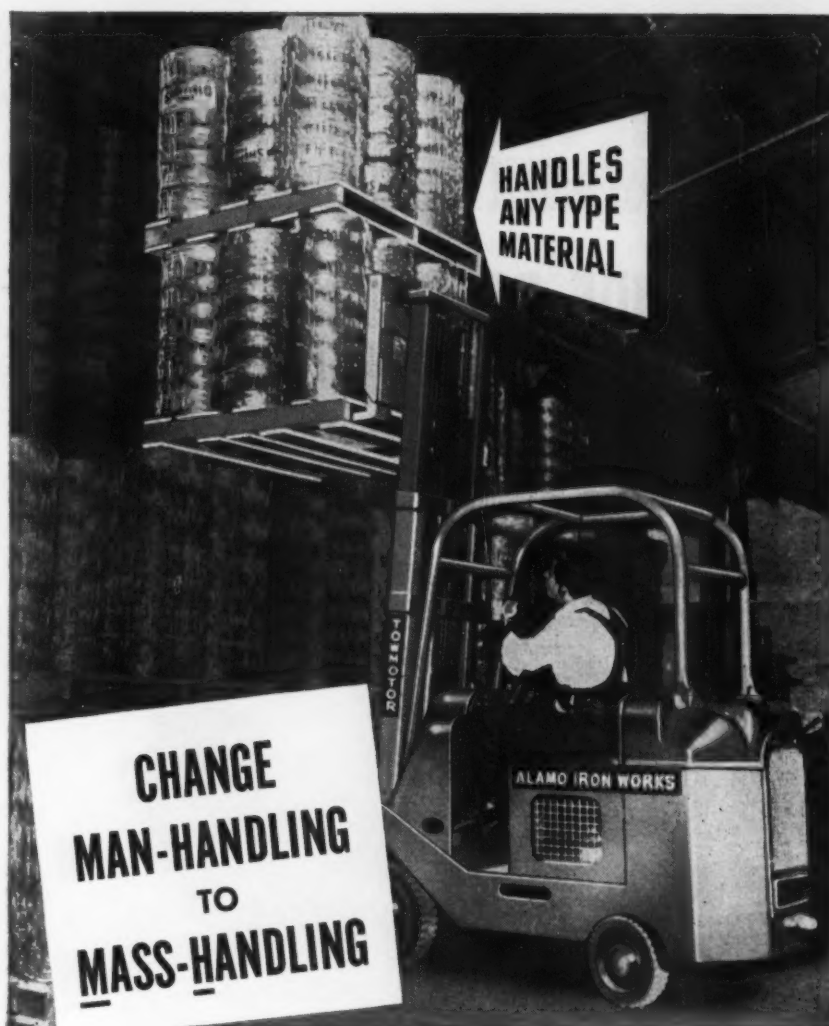
Please send my copy of "Du Pont Sodium Hydride Descaling Process."

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Firm

Position

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Your quickest, surest step to lowered production costs and increased profits is to eliminate excess handling of your raw materials and products . . . to change man-handling to **Mass-Handling** with Towmotor Fork Lift Trucks and Tractors. Reduce the costly man-hours spent transporting, lifting and stacking products within your plant . . . and your production payroll costs drop as much as 60%. Warehouse costs nosedive, too, because Towmotor uses every available inch of overhead storage space. Find out how YOU can cut your production costs . . . write TODAY for a copy of "Handling Materials Illustrated." Towmotor Corporation, Div. 15, 1226 East 152nd St., Cleveland 10, Ohio. Representatives in all Principal Cities in U. S. and Canada.

There's a Towmotor for every handling job!

12 Towmotor models plus 12 standard Towmotor Accessories cut costs on handling loads from 1,500 to 15,000 lbs. Towmotor Special Engineering solves the most difficult specialized handling problems. Ask to see the 30-min. Towmotor sound movie, "The One Man Gang" in your office. Shows how leading industries cut handling costs . . . with Towmotor!



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and TRACTORS**

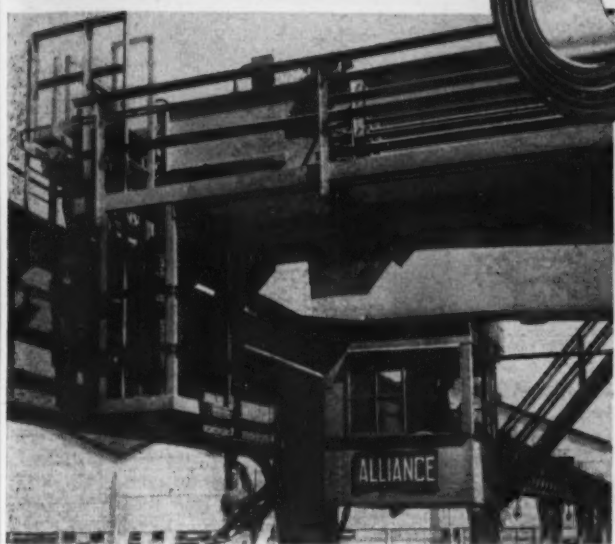
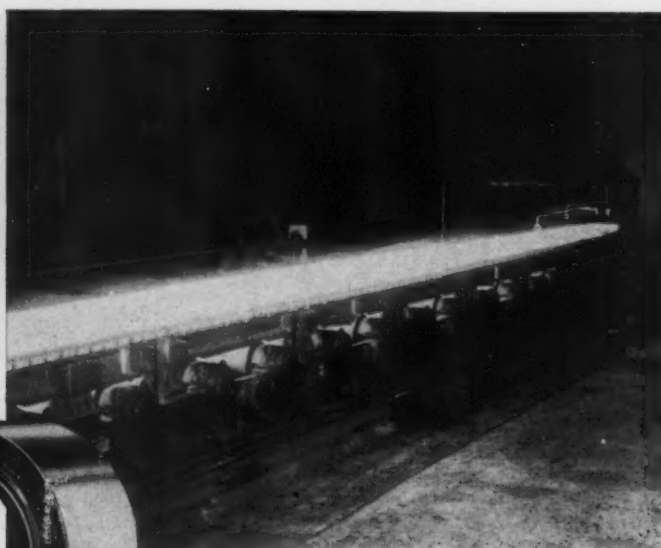
*MH is Mass Handling!

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

METAL SHOW EXHIBITORS

(Continued)

- J. A. Richards Co., Kalamazoo, Mich. Hand and air operated bending machines. Booth 1914.
- Riehle Testing Machine Div., East Moline, Ill. 30,000 lb universal testing machine, 60,000 lb machine, hardness tester, etc. Booth 2025.
- Riverside Metal Co., Riverside, N. J. Movie on nonferrous metals, wire test. Booth 406.
- Roberts Co., C. A., Chicago 7. Steel tubing. Booth 2435.
- Rockwell Mfg. Co., Pittsburgh 8. Gas, gasoline, oil and water meters, regulators, cast and forged steel valves, lubricated plug valves. Booth 2701.
- Rolock, Inc., Fairfield, Conn. Alloy equipment, muffles, racks, fixtures, screens, boxes, trays. Booth 522.
- Ruemelin Mfg. Co., Milwaukee, Wis. Welding fume collector, sand blast cabinet. Booth 2114.
- Ryerson & Son, Inc., Joseph T., Chicago 80. Free machining alloy steel, other certified alloy steels. Booth 1016.
- Safety Clothing & Equipment Co., Cleveland 3. Asbestos gloves and clothing, and equipment for worker protection. Booth 2535.
- Safety First Shoe Co., Holliston, Mass. Moccasin style safety shoe, other safety shoes. Booth 2520.
- Sales Service Machine Tool Co., St. Paul. Press-Rite power press. Booth 1720.
- Salkover Metal Processing of Ill., Inc., Chicago 24. Copper brazed assemblies. Booth 1814.
- Geo. T. Schmidt, Inc., Chicago 13. Hydraulic power marking machine, planetary production marking machine. Booth 2124.
- A. Schrader's Son Div., Brooklyn, N. Y. Safety control for power presses. Booth 518.
- Sciaky Bros., Chicago 38. Electric resistance welding equipment. Booth 215.
- C. U. Scott & Son, Inc., Rock Island, Ill. Super Scottsonized samples of stainless steel. Booth 1235.
- Scovill Mfg. Co., Waterbury, Conn. High speed brass rod. Booth 518.
- Selas Corporation of America, Philadelphia 34. Heating furnaces and burners. Booth 920.
- Sentry Co., Foxboro, Mass. High speed steel hardening furnace. Booth 602.
- Shell Oil Co., New York. Industrial lubricants and coolants. Booth 315.
- Sherman & Company, Flushing, N. Y. Platinum, gold, silver, etc. Booth 1824.
- Sinclair Refining Co., Chicago. Cutting oils lubricants, preservative coating. Booth 2533.
- Smith Welding Equip. Corp., Minneapolis, Minn. Oxy-acetylene and cutting apparatus, etc. Booth 2518.
- Socony Vacuum Oil Co., Inc., New York. Industrial lubricants and coolants. Booth 2510.
- South Florida Test Service, Miami, Fla. Testing service. Booth 2620.
- So California Edison Co., Ltd. Los Angeles. Booth 815.



Easing the loads at Lorain

One of the reasons why the Lorain Works of National Tube is such a smooth running steel mill is its wise and generous use of Hyatt Roller Bearings.

The table rollers are Hyatt-equipped and the ingot, charging and transfer cars too. Likewise do the cranes and mill motors operate more smoothly with similarly dependable Hyatts.

Like most other steel mills, Lorain has proved by experience that Hyatts take the heavy loads with less bearing wear and care. Whether it is in the design of new equipment or in change-overs, Hyatts are the bearings preferred by most steel mills. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J., Chicago, Detroit, Pittsburgh and Oakland, Calif.

HYATT ROLLER BEARINGS

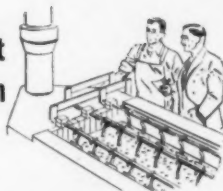
News about

UNICHROME
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COATINGS for METALS

METALLIC • ORGANIC
DECORATIVE • PROTECTIVE

Greatest
improvement
in chromium
plating in
20 years



A self-regulating, high speed bath, Unichrome S.R.H.S. Chromium plates faster, helps to reduce rejects due to "grey" and "rainbow" plate and also due to "missing" and "burning." It lowers the load on generators for a given tankful of work, steps up capacity of chromium plating equipment.

New primer for magnesium and aluminum

Hard-to-coat metals such as magnesium and aluminum get a finish that really sticks when coated with Unichrome Primer AP-10. Not only does this organic primer promote adhesion, but it also provides extra corrosion-resistance and increases durability of top coats used.



How to
save money
on painting

Many plants need extra rugged protection against acids, alkalies, salts, and water—and get it with Ucilon® Protective Coating Systems. Applied to tanks, ducts, walls, piping, tough Ucilon Coatings are helping many concerns maintain equipment in attractive condition, while reducing frequency and expense of painting.

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Chicago 4, Ill. • Los Angeles 13, Calif.
In Canada:
United Chromium Limited, Toronto, Ont.

METAL SHOW EXHIBITORS

(Continued)

Special Welding Alloy Co., Inc., Long Island City, N. Y. Booth 2454.

Spencer Turbine Co., Hartford 6. Gas Boosters and turbo-compressors. Booth 1019.

Sperry Products, Inc., Danbury, Conn. Ultrasonic reflectoscope and ultrasonic reflectogage, self-sealing couplings, hydraulic remote controls. Booth 228.

Standard American Engineering Co., Lyons, Ill. Radivecton industrial furnace. Booth 2743.

Standard Electrical Tool Co., Cincinnati 4. Twin-motor variable speed snagging grinder. Booth 2743.

Standard Oil Co. of Indiana, Chicago, Ill. Lubricants, drawing compounds, heat treating products. Booth 2659.

Standard Pressed Steel Co., Jenkintown, Pa. Pressed steel products, hollow set and socket head cap screws, steel shop equipment. Booth 2434.

L. S. Starrett Co., Athol, Mass. Mechanics hand measuring tools and precision instruments. Booth 2438.

Steel City Testing Machines, Inc., Detroit. Testing machines. Booth 2519.

Steel Parts Mfg. Co., Chicago 44. Steel belt conveyors, roller and skate wheel conveyors. Both 2552.

Edwin B. Stimpson Co., Inc. Screw machine parts, eyelets, rivets, snap fasteners, stampings. Booth 1820.

F. J. Stokes Machine Co., Philadelphia 20. High speed powder metal press. Booth 420.

Stoody Co., Whittier, Calif. Automatic rebuilding and hard-facing of tractor rollers, castings. Booth 1615.

Streeter-Amet Company, Chicago. Recording counters for production radiation work, etc. Booth 2715.

D. A. Stuart Oil Co., Chicago 23. New methods for applying cutting and grinding fluids and drawing compounds, extreme pressure lubricants. Booth 328.

Superior Tube Co., Norristown, Pa. Seamless nickel tubing, titanium tubing, mechanical and specialty tubing. Booth 2435.

Surface Combustion Corp., Toledo 1. Atmosphere generator. Booth 1106.

Technical Metal Processing, Inc., Cleveland 14. Heat treating and copper brazing. Booth 1814.

Tempil Corp., New York 11. Tempil pellets and Tempilaq for temperature determination. Booth 515.

G. H. Tennant Co., Minneapolis 11. Factory sweeper, heavy-industry floor machines, floor scarifiers. Booth 2528.

Texas Co., New York 17. Cutting lubricants and coolants, cutting threads and grinding threads. Booth 1906.

Timken Roller Bearing Co., Canton, Ohio. End products of alloy steel and seamless steel tubing. Booth 1006.

Tincher Products Co., Sycamore, Ill. Pressure tank for impregnating parts and castings, hole repair device. Booth 2641.

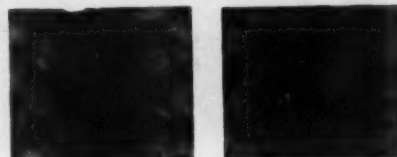
Tinnerman Products, Inc., Cleveland 13. "Speednut" fasteners. Booth 1825.

Here's Why
TRU-STEEL SHOT
Costs Less to Use

LIFE COMPARISON

TRU-STEEL vs. CHILLED IRON SHOT

Magnified 10X



TRU-STEEL

After 1500 Passes

CHILLED IRON

After 50 Passes

Users Find TRU-STEEL Has 5 Important Advantages

- LASTS MANY TIMES LONGER—LESS SHOT IS USED

Gray Forgings and Stamping, Ltd.: "We find Tru-Steel Shot lasts from 5 to 6 times as long as ordinary shot."

- REDUCES CLEANING COSTS PER TON

A Detroit Manufacturer: "Just figuring the savings in abrasive and parts alone, we showed a savings of 30% in the cost per ton of parts cleaned compared to our previous costs with chilled iron shot."

- SAVES STORAGE AND TRANSPORTATION COSTS

A Prominent User: "In general Tru-Steel costs half as much as ordinary shot, cuts down on maintenance and costly parts with less handling and storage."

- INCREASES LIFE OF MACHINE PARTS

A Midwest Manufacturer: "Another big advantage we find is the longer life of the machine itself. We saved 63% in the cost of replacement parts, not counting the time saved by our maintenance men in not having to replace parts often."

- REDUCES MACHINE MAINTENANCE COSTS

A steel foundry reports the use of Tru-Steel Shot resulted in a savings of 73% on wearables, 63% on abrasive consumption, and 80% on maintenance labor.

Write for Bulletin No. 59

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American

WHEELABRATOR & EQUIPMENT CORP.

510 S. Byrkit Street, Mishawaka 3, Indiana

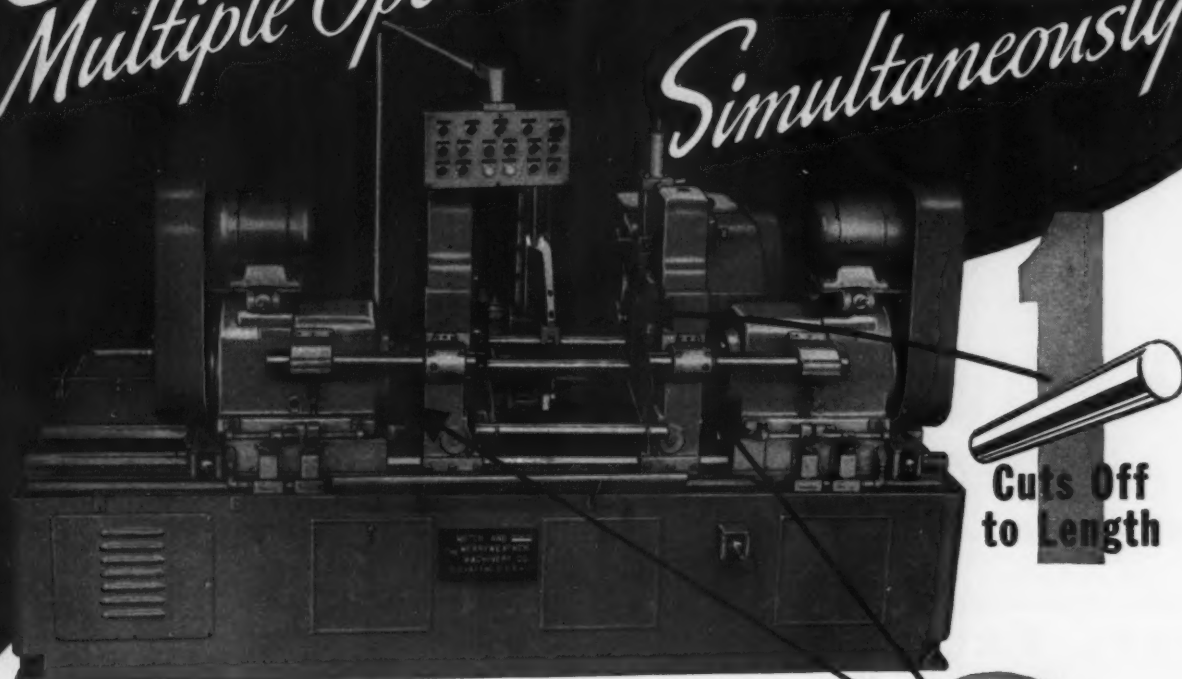
Mfd. by: Steel Shot Producers, Inc.

UNITIZE

Multiple Operations!

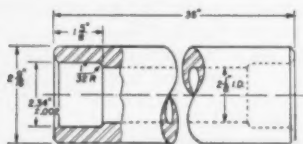
CUT OFF TO LENGTH AND
MACHINE BOTH ENDS —

Simultaneously

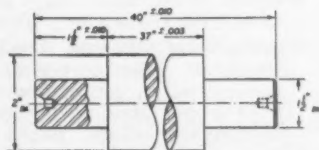


Cuts Off
to Length

Capitalize on Motch & Merryweather's fast accurate circular sawing by combining it with simultaneous double-end machining operations. Save handling and floor space! Increase output and reduce cost! Unitize your production.

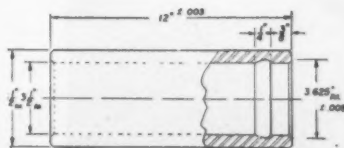


Operation: Cut off; bore and chamfer inside and outside, both ends.
Material: SAE 1020 steel tubing.
Production: 140 pcs/hr. @ 100% eff.



Operation: Cut off; hollow mill and center drill both ends.
Material: C 1117 cold drawn steel.
Production: 84 pcs/hr. @ 100% eff.

Write for further information.



Operation: Cut off; face and chamfer both ends; internal groove one end.
Material: C 1015 seamless steel tubing.
Production: 110 pcs/hr. @ 100% eff.

Machines Both Ends

- Chamfers both ends • Center drills both ends • Center drills and chamfers both ends • Threads both ends
- Turns one or both ends (box tool)
- Chamfers O. D. and I. D. of tubing
- Reams one or both ends of tubing
- Chamfers O. D. and reams both ends of tubing • External grooves and chamfers one or both ends
- Internal grooves, faces and chamfers O. D. and I. D. one or both ends of tubing

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY

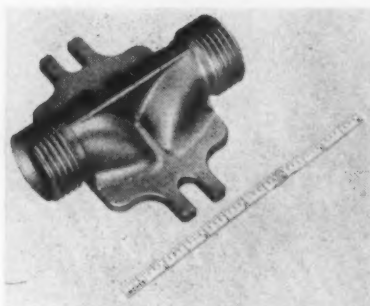
715 PENTON BUILDING

CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT





Valve Body
For Hills-McCanna
Using 316 Stainless Steel

The ultimate in PRECISION CASTINGS

Booking dies and frozen
mercury patterns assure you of



Mounting Flange Bracket
For Westinghouse Generator
Using 410 Stainless

- SOUNDNESS
- ACCURACY
- CLOSE TOLERANCES
- 60-80 MICRO FINISH
- MINIMUM MACHINING

Intricate precision castings in size
ranges not available by conven-
tional casting methods. All ferrous
and nonferrous metals.

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EAST 45th ST. AND HAMILTON AVE. • CLEVELAND 14, OHIO



The **UNBRAKO** Socket Head Cap Screw

... is specified by designers and production men everywhere because
of its time-saving knurled head and its uniformly high quality.

SOCKET **UNBRAKO** SCREWS

See us at Booth 2434, Convention of National Metal Congress and Exposition, Chicago, Oct. 23 to 27.

-SPS- STANDARD PRESSED STEEL CO.
JENKINTOWN 17, PENNSYLVANIA

METAL SHOW EXHIBITORS

(Continued)

- Tin Research Institute, Inc., Columbia 1, Ohio. Tin products and research publications. Booth 2565.
- Titanium Metals Corp. of America, N. Y. 17. Titanium mill items and products. Booth 2207.
- Toolskill Company, Chicago. Tool, jig, fixture and die components. Booth 2636.
- Torit Mfg. Co., St. Paul 2. Self-contained dust collectors for grinders, polishing machines, etc. Booth 2537.
- Tracerlab, Inc., Boston 10. Beta gauge, radio-active Cobalt-60 setup. Booth 2420.
- Tyler Mfg. Co., Los Angeles. Booth 2449.
- Uddeholm Co. of America, Inc., New York, N. Y. Tool Steel. Booth 2734.
- Udylite Corp., Detroit 11. Automatic electroplater. Booth 907.
- Union Carbide & Carbon Corp., New York 17. (See National Carbon Co., Haynes Stellite Co., Linde Air Products Co.) Booth 901.
- U. S. Electrical Motors, Inc., Los Angeles 54. Syncrogear and Varidrive motors, vertical hollowshaft and other motors. Booth 2637.
- U. S. Pipe & Foundry Co., Burlington, N. J. Dual metal centrifugal castings, iron and steel centrifugally cast products from permanent metal molds. Booth 803.
- Universal Castings Corp., Chicago. Nonferrous precision plaster mold castings. Booth 2724.
- Univertical Machine Co., Berkley, Mich. Booth 2712.
- Upton Electric Furnace Div., Detroit. Salt bath electric annealing furnaces. Booth 2736.
- Verson Allsteel Press Co., Chicago 19. Progressive and transfer stampings, press brake, press with safety bolster. Booth 122.
- Wallace Supplies Mfg. Co., Chicago 14. Pipe and tube rolling machine, portable hydraulic ram bender. Booth 114.
- Martin Wells, Inc., Los Angeles 1. Rod saver and electrode holders, valve seats for industrial engines. Booth 2541.
- Wells Mfg. Corp., Three Rivers, Mich. Band saw machines. Booth 2708.
- Western Brass Mills, East Alton, Ill. (See Olin Industries.) Booth 2502.
- Westinghouse Electric Corp., Pittsburgh 30. New dc welder without moving parts, jet engine cutaway, phos copper brazing, HF generator, heat treater alloys. Booth 622.
- Wheelco Instruments Co., Chicago 7. Combustion safeguard, strip chart recorder, resistance thermometer, pyrometer controllers, portable instruments. Booth 1909.
- Wilson Mechanical Instrument Co., New York 17. Rockwell and micro hardness testers. Booth 519.
- Wilson Welder & Metals Co., Inc., N. Y. 17. (See Air Reduction Co.) Booth 422.
- Worthington Pump and Machinery Corp., Harrison, N. J. Work turning rolls, other welding positioners. Booth 506.

Resume Your Reading on Page 179

MARKET

IRON AGE
FOUNDED 1855
MARKETS & PRICES

Briefs and Bulletins

steel prices—Effective Oct. 3, Pittsburgh Steel Co. advanced prices on some wire and tubular products. Largest advance was \$10.00 per ton on drill pipe. Casing is up \$7.00. Barbed wire was increased seven columns, or approximately \$7.00; farm and poultry wire (woven) seven columns; rods and wire rods, \$4.00 per ton; certain grades of manufacturers' wire, \$5.00; merchant quality wire, annealed and galvanized, \$5.00 per ton; tube specialties (mechanical and pressure tubing) approximately 4 pct; oil well tubing, \$5.00 per ton. Price of low fence was also increased.

more coke boosts—Following last week's increases in foundry coke, Philadelphia Coke Co. raised its price for foundry coke 85c to \$22.10 per net ton f.o.b. Philadelphia. The Painesville, Ohio, price was pushed up \$1.35 to \$23.25 by Diamond Alkali Co. and Pickands Mather & Co. boosted their price \$1.25 to a range of \$22.29 to \$22.50 delivered, Erie, Pa.

fabricated aluminum—Aluminum Co. of America has raised prices on its fabricated aluminum products, effective between Sept. 29 and Oct. 4, depending on the product. Estimates are that the increases average slightly less than 10 pct.

Follansbee hike—Follansbee Steel Corp. increased the price of cold-rolled strip \$7.00 per ton—from \$4.50 to \$4.85 per 100 lb. Follansbee Polished Blue Steel, 20-gage, 36-in. wide, was moved a like amount from \$5.60 to \$5.95 per 100 lb.

hi-strength, low-alloy—Youngstown Sheet & Tube Co. increased the following hi-strength, low-alloy products by \$5.00 per ton: Hot-rolled bars, sheet and strip, plate, cold-rolled sheet and strip, and structural shapes.

raises prices—Timken Roller Bearing Co., Canton, Ohio, has announced a 5 pct increase on all prices effective Oct. 9.

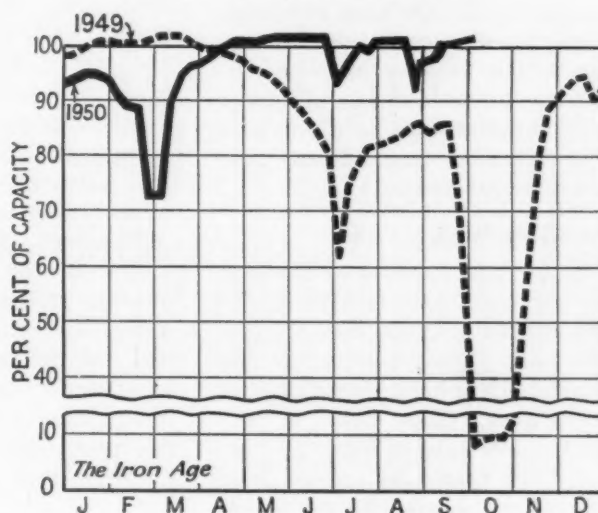
galvanized table—In increasing prices of pipe and wire galvanized products, Jones and Laughlin Steel Corp. established pricing tables to reflect fluctuations in the price of zinc. As the price of prime western zinc at East St. Louis goes up or down, J & L's galvanized product prices will react accordingly. (See p. 192 for full story.)

big order—The impact of defense orders on stainless producers is already being felt. One DO order for jet propulsion units is said to require 4300 to 4500 tons of type 347 stainless. One company indicated they could not fill such an order unless they obtained additional supplies of nickel, columbium and tantalum.

thin gage flat-rolled—Niles Rolling Mill Co., Niles, Ohio, subsidiary of Sharon Steel Corp., raised prices on its thin gage flat-rolled products by \$5.00 to \$15.00 per ton.

galvanized pipe up—A. M. Byers Co. raised all its prices on galvanized wrought iron pipe by \$5.00 per ton.

Steel Operations**



District Operating Rates—Per Cent of Capacity**

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
Oct. 1.....	100.0*	101.5*	93.0	94.0	95.5*	104.0	104.0	104.0	106.0	106.0	85.0	91.5	98.0	101.0
Oct. 8.....	100.0	103.0	93.5	94.0	95.5	104.0	102.0	104.0	103.0	104.0	89.0	94.0	114.0	101.5

* Revised.

** Steel operations for the first half of 1950 are based on annual capacity of 99,392,800 net tons. Beginning July 1, 1950, operations are based on new annual capacity of 100,563,500 net tons.

Nonferrous Metals OUTLOOK

Market Activities

New York — William Harrison, administrator of the National Production Authority, has stated that his organization is expecting to institute mandatory allocation of some critical materials within the next 2 or 3 months. Specifically mentioned were aluminum, brass, and copper.

Mr. Harrison estimated that aluminum for civilian consumption would be reduced by at least 20 pct and he pointed out that controls would be necessary despite United Nations successes in Korea because of the decision to maintain an armed force of 3 million men and because of the military aid program for Western Europe. Details of the allocation program were not specifically discussed.

Brass mills are also expecting a severe reduction in their civilian production because of NPA Order No. 2. Short supply of copper will necessitate taking all defense requirements away from non-essential production.

On 3-Day Week

Meanwhile, because of the copper shortage, American Brass Co. has put its casting shop on a 3-day week. Other divisions of this company have been operating on a 4-day week. Chase Brass & Copper Co. and Scoville Mfg. Co. have also been forced to reduce their operations because of the shortage.

Lead is continuing in good demand and no one is having any difficulty in selling it, but, because it has not been mentioned on any NPA list, it seems that the government is not very concerned about this metal. Consequently, scrap lead has dropped $\frac{3}{4}$ ¢ per lb

to a range of 13¢ to 13 $\frac{1}{4}$ ¢ per lb.

To fill old orders for scrap copper destined for conversion deals, some brokers have been paying as high as 25¢ and 26¢ per lb of No. 1 material. Zinc scrap continues to be in extremely short supply.

Since producers raised their prices of fabricated aluminum last week, secondary ingots have risen up to 1 $\frac{1}{2}$ ¢ per lb higher. Aluminum scrap is also higher this week. New prices are: Pistons and struts, 10 $\frac{1}{2}$ ¢ to 11¢; crankcases, old sheet and utensils, 24S dural clips, and miscellaneous cast aluminum, 13 $\frac{1}{2}$ ¢ to 14¢; borings and turnings, 9¢; and 2S clip-pings, 16 $\frac{1}{2}$ ¢ to 17¢ per lb.

The Dept. of Commerce has established the following fourth quarter export quotas on aluminum, lead, and zinc: Aluminum and aluminum products, 7000 short tons; lead and lead products, open end; zinc and zinc products, 6500 short tons.

Filing dates for fourth quarter

Harrison says mandatory allocation coming soon . . . Copper shortage forces cutbacks . . . Secondary aluminum and scrap higher . . . Fabricated magnesium on way up.

submission of license applications have already been announced as Oct. 9 to Oct. 20, inclusive. Since lead has not been placed under a quantitative quota, the fourth quarter filing date requirement has been eliminated and applications for lead export licenses may be submitted at any time during the calendar quarter.

Tin Tops All-Time Peak

On Tuesday, with the price of \$1.11 $\frac{1}{4}$ per lb, the tin market skyrocketed to a figure 3 $\frac{1}{2}$ ¢ over the all-time high which was reached 2 months ago. The metal was active in all markets last week at the high prices.

Following the recent announcement of Dow Chemical Co. stating that magnesium ingots were increased to 24 $\frac{1}{2}$ ¢ per lb, magnesium extrusions have been raised 2 $\frac{1}{2}$ ¢, sheet has been raised 5¢, and extruded anodes have been raised 3¢ per lb. The new price list was not ready early this week but it will be out shortly.

NONFERROUS METALS PRICES

	Oct. 4	Oct. 5	Oct. 6	Oct. 7	Oct. 9	Oct. 10
Copper, electro, Conn. . . .	24.50	24.50	24.50	24.50	24.50	24.50
Copper, Lake, delivered . .	24.025	24.025	24.025	24.025	24.025	24.025
Tin, Straits, New York . .	\$1.06	\$1.06	\$1.075	.....	\$1.0925	*\$1.1125
Zinc, East St. Louis	17.50	17.50	17.50	17.50	17.50	17.50
Lead, St. Louis	15.80	15.80	15.80	15.80	15.80	15.80

Note: Quotations are going prices.
*Tentative.

MILL PRODUCTS

Aluminum

(Base prices, cents per pound, base 30,000 lb, f.o.b. shipping point, freight allowed)

Flat Sheet: 0.188 in., 2S, 3S, 30.1¢; 4S, 61S-O, 32¢; 52S, 34.1¢; 24S-O, 24S-OAL, 32.9¢; 75S-O, 75S-OAL, 39.9¢; 0.081 in., 2S, 3S, 31.2¢; 4S, 61S-O, 33.5¢; 52S, 35.6¢; 24S-O, 24S-OAL, 34.1¢; 75S-O, 75S-OAL, 41.8¢; 0.032 in., 2S, 3S, 32.9¢; 4S, 61S-O, 37.1¢; 52S, 39.8¢; 24S-O, 24S-OAL, 41.7¢; 75S-O, 75S-OAL, 52.2¢.

Plate: ¼ in. and heavier: 2S, 3S-F, 28.3¢; 4S-F, 30.2¢; 52S-F, 31.8¢; 61S-O, 30.8¢; 24S-O, 24S-OAL, 32.4¢; 75S-O, 75S-OAL, 38.8¢.

Extruded Solid Shapes: Shape factors 1 to 5, 37.5¢ to 74.5¢; 12 to 14, 38.2¢ to 89¢; 24 to 26, 41.1¢ to 112.2¢; 36 to 38, 46.9¢ to 181.5¢.

Red, Rolled: 1.5 to 4.5 in., 2S-F, 3S-F, 37.5¢ to 33.5¢; cold-finished, 0.375 to 3 in., 2S-F, 3S-F, 40.5¢ to 35¢.

Screw Machine Stock: Rounds, 11S-T3, ¼ in. to 1 1/32 in., 53.5¢ to 42¢; ½ to 1 ½ in., 41.5¢ to 39¢; 1 9/16 to 3 in., 38.5¢ to 36¢; 17S-T4 lower by 1.5¢ per lb. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in., 2S, 39.5¢ to 29¢; 52S, 48¢ to 35¢; 56S, 51¢ to 42¢; 17S-T4, 54¢ to 37.5¢; 61S-T4, 48.5¢ to 37¢; 75S-T6, 84¢ to 67.5¢.

Extruded Tubing, Rounds: 63S-T5, OD in. in. 1¼ to 2, 37¢ to 54¢; 2 to 4, 33.5¢ to 45.5¢; 4 to 6, 34¢ to 41.5¢; 6 to 9, 34.5¢ to 43.5¢.

Roofing Sheet, Flat: 0.019 in. x 28 in. per sheet, 72 in., \$1.142; 96 in., \$1.522; 120 in., \$1.902; 144 in., \$2.284. Gage 0.024 in. x 28 in., 72 in., \$1.379; 96 in., \$1.839; 120 in., \$2.299; 144 in., \$2.759. Coiled Sheet: 0.019 in. x 28 in., 28.2¢ per lb.; 0.024 in. x 28 in., 26.9¢ per lb.

Magnesium

Does not reflect latest increase.

(Cents per lb, f.o.b. mill, freight allowed)

Sheet and Plate: M-O, FS-O, ¼ in., 58¢ to 60¢; 3/16 in., 60¢ to 62¢; ¼ in., 62¢ to 64¢; 5/16 in., 64¢ to 66¢; 3/8 in., 66¢ to 68¢; 7/16 in., 68¢ to 70¢; 1/2 in., 70¢ to 72¢; 5/8 in., 72¢ to 74¢; 3/4 in., 74¢ to 76¢; 7/8 in., 76¢ to 78¢; 1 in., 78¢ to 80¢; 1 1/8 in., 80¢ to 82¢; 1 1/4 in., 82¢ to 84¢; 1 1/2 in., 84¢ to 86¢; 1 3/4 in., 86¢ to 88¢; 1 7/8 in., 88¢ to 90¢; 2 in., 90¢ to 92¢; 2 1/4 in., 92¢ to 94¢; 2 1/2 in., 94¢ to 96¢; 2 3/4 in., 96¢ to 98¢; 3 in., 98¢ to 100¢; 3 1/4 in., 100¢ to 102¢; 3 1/2 in., 102¢ to 104¢; 3 3/4 in., 104¢ to 106¢; 4 in., 106¢ to 108¢; 4 1/4 in., 108¢ to 110¢; 4 1/2 in., 110¢ to 112¢; 4 3/4 in., 112¢ to 114¢; 5 in., 114¢ to 116¢; 5 1/4 in., 116¢ to 118¢; 5 1/2 in., 118¢ to 120¢; 5 3/4 in., 120¢ to 122¢; 6 in., 122¢ to 124¢; 6 1/4 in., 124¢ to 126¢; 6 1/2 in., 126¢ to 128¢; 6 3/4 in., 128¢ to 130¢; 7 in., 130¢ to 132¢; 7 1/4 in., 132¢ to 134¢; 7 1/2 in., 134¢ to 136¢; 7 3/4 in., 136¢ to 138¢; 8 in., 138¢ to 140¢; 8 1/4 in., 140¢ to 142¢; 8 1/2 in., 142¢ to 144¢; 8 3/4 in., 144¢ to 146¢; 9 in., 146¢ to 148¢; 9 1/4 in., 148¢ to 150¢; 9 1/2 in., 150¢ to 152¢; 9 3/4 in., 152¢ to 154¢; 10 in., 154¢ to 156¢; 10 1/4 in., 156¢ to 158¢; 10 1/2 in., 158¢ to 160¢; 10 3/4 in., 160¢ to 162¢; 11 in., 162¢ to 164¢; 11 1/4 in., 164¢ to 166¢; 11 1/2 in., 166¢ to 168¢; 11 3/4 in., 168¢ to 170¢; 12 in., 170¢ to 172¢; 12 1/4 in., 172¢ to 174¢; 12 1/2 in., 174¢ to 176¢; 12 3/4 in., 176¢ to 178¢; 13 in., 178¢ to 180¢; 13 1/4 in., 180¢ to 182¢; 13 1/2 in., 182¢ to 184¢; 13 3/4 in., 184¢ to 186¢; 14 in., 186¢ to 188¢; 14 1/4 in., 188¢ to 190¢; 14 1/2 in., 190¢ to 192¢; 14 3/4 in., 192¢ to 194¢; 15 in., 194¢ to 196¢; 15 1/4 in., 196¢ to 198¢; 15 1/2 in., 198¢ to 200¢; 15 3/4 in., 200¢ to 202¢; 16 in., 202¢ to 204¢; 16 1/4 in., 204¢ to 206¢; 16 1/2 in., 206¢ to 208¢; 16 3/4 in., 208¢ to 210¢; 17 in., 210¢ to 212¢; 17 1/4 in., 212¢ to 214¢; 17 1/2 in., 214¢ to 216¢; 17 3/4 in., 216¢ to 218¢; 18 in., 218¢ to 220¢; 18 1/4 in., 220¢ to 222¢; 18 1/2 in., 222¢ to 224¢; 18 3/4 in., 224¢ to 226¢; 19 in., 226¢ to 228¢; 19 1/4 in., 228¢ to 230¢; 19 1/2 in., 230¢ to 232¢; 19 3/4 in., 232¢ to 234¢; 20 in., 234¢ to 236¢; 20 1/4 in., 236¢ to 238¢; 20 1/2 in., 238¢ to 240¢; 20 3/4 in., 240¢ to 242¢; 21 in., 242¢ to 244¢; 21 1/4 in., 244¢ to 246¢; 21 1/2 in., 246¢ to 248¢; 21 3/4 in., 248¢ to 250¢; 22 in., 250¢ to 252¢; 22 1/4 in., 252¢ to 254¢; 22 1/2 in., 254¢ to 256¢; 22 3/4 in., 256¢ to 258¢; 23 in., 258¢ to 260¢; 23 1/4 in., 260¢ to 262¢; 23 1/2 in., 262¢ to 264¢; 23 3/4 in., 264¢ to 266¢; 24 in., 266¢ to 268¢; 24 1/4 in., 268¢ to 270¢; 24 1/2 in., 270¢ to 272¢; 24 3/4 in., 272¢ to 274¢; 25 in., 274¢ to 276¢; 25 1/4 in., 276¢ to 278¢; 25 1/2 in., 278¢ to 280¢; 25 3/4 in., 280¢ to 282¢; 26 in., 282¢ to 284¢; 26 1/4 in., 284¢ to 286¢; 26 1/2 in., 286¢ to 288¢; 26 3/4 in., 288¢ to 290¢; 27 in., 290¢ to 292¢; 27 1/4 in., 292¢ to 294¢; 27 1/2 in., 294¢ to 296¢; 27 3/4 in., 296¢ to 298¢; 28 in., 298¢ to 300¢; 28 1/4 in., 300¢ to 302¢; 28 1/2 in., 302¢ to 304¢; 28 3/4 in., 304¢ to 306¢; 29 in., 306¢ to 308¢; 29 1/4 in., 308¢ to 310¢; 29 1/2 in., 310¢ to 312¢; 29 3/4 in., 312¢ to 314¢; 30 in., 314¢ to 316¢; 30 1/4 in., 316¢ to 318¢; 30 1/2 in., 318¢ to 320¢; 30 3/4 in., 320¢ to 322¢; 31 in., 322¢ to 324¢; 31 1/4 in., 324¢ to 326¢; 31 1/2 in., 326¢ to 328¢; 31 3/4 in., 328¢ to 330¢; 32 in., 330¢ to 332¢; 32 1/4 in., 332¢ to 334¢; 32 1/2 in., 334¢ to 336¢; 32 3/4 in., 336¢ to 338¢; 33 in., 338¢ to 340¢; 33 1/4 in., 340¢ to 342¢; 33 1/2 in., 342¢ to 344¢; 33 3/4 in., 344¢ to 346¢; 34 in., 346¢ to 348¢; 34 1/4 in., 348¢ to 350¢; 34 1/2 in., 350¢ to 352¢; 34 3/4 in., 352¢ to 354¢; 35 in., 354¢ to 356¢; 35 1/4 in., 356¢ to 358¢; 35 1/2 in., 358¢ to 360¢; 35 3/4 in., 360¢ to 362¢; 36 in., 362¢ to 364¢; 36 1/4 in., 364¢ to 366¢; 36 1/2 in., 366¢ to 368¢; 36 3/4 in., 368¢ to 370¢; 37 in., 370¢ to 372¢; 37 1/4 in., 372¢ to 374¢; 37 1/2 in., 374¢ to 376¢; 37 3/4 in., 376¢ to 378¢; 38 in., 378¢ to 380¢; 38 1/4 in., 380¢ to 382¢; 38 1/2 in., 382¢ to 384¢; 38 3/4 in., 384¢ to 386¢; 39 in., 386¢ to 388¢; 39 1/4 in., 388¢ to 390¢; 39 1/2 in., 390¢ to 392¢; 39 3/4 in., 392¢ to 394¢; 40 in., 394¢ to 396¢; 40 1/4 in., 396¢ to 398¢; 40 1/2 in., 398¢ to 400¢; 40 3/4 in., 400¢ to 402¢; 41 in., 402¢ to 404¢; 41 1/4 in., 404¢ to 406¢; 41 1/2 in., 406¢ to 408¢; 41 3/4 in., 408¢ to 410¢; 42 in., 410¢ to 412¢; 42 1/4 in., 412¢ to 414¢; 42 1/2 in., 414¢ to 416¢; 42 3/4 in., 416¢ to 418¢; 43 in., 418¢ to 420¢; 43 1/4 in., 420¢ to 422¢; 43 1/2 in., 422¢ to 424¢; 43 3/4 in., 424¢ to 426¢; 44 in., 426¢ to 428¢; 44 1/4 in., 428¢ to 430¢; 44 1/2 in., 430¢ to 432¢; 44 3/4 in., 432¢ to 434¢; 45 in., 434¢ to 436¢; 45 1/4 in., 436¢ to 438¢; 45 1/2 in., 438¢ to 440¢; 45 3/4 in., 440¢ to 442¢; 46 in., 442¢ to 444¢; 46 1/4 in., 444¢ to 446¢; 46 1/2 in., 446¢ to 448¢; 46 3/4 in., 448¢ to 450¢; 47 in., 450¢ to 452¢; 47 1/4 in., 452¢ to 454¢; 47 1/2 in., 454¢ to 456¢; 47 3/4 in., 456¢ to 458¢; 48 in., 458¢ to 460¢; 48 1/4 in., 460¢ to 462¢; 48 1/2 in., 462¢ to 464¢; 48 3/4 in., 464¢ to 466¢; 49 in., 466¢ to 468¢; 49 1/4 in., 468¢ to 470¢; 49 1/2 in., 470¢ to 472¢; 49 3/4 in., 472¢ to 474¢; 50 in., 474¢ to 476¢; 50 1/4 in., 476¢ to 478¢; 50 1/2 in., 478¢ to 480¢; 50 3/4 in., 480¢ to 482¢; 51 in., 482¢ to 484¢; 51 1/4 in., 484¢ to 486¢; 51 1/2 in., 486¢ to 488¢; 51 3/4 in., 488¢ to 490¢; 52 in., 490¢ to 492¢; 52 1/4 in., 492¢ to 494¢; 52 1/2 in., 494¢ to 496¢; 52 3/4 in., 496¢ to 498¢; 53 in., 498¢ to 500¢; 53 1/4 in., 500¢ to 502¢; 53 1/2 in., 502¢ to 504¢; 53 3/4 in., 504¢ to 506¢; 54 in., 506¢ to 508¢; 54 1/4 in., 508¢ to 510¢; 54 1/2 in., 510¢ to 512¢; 54 3/4 in., 512¢ to 514¢; 55 in., 514¢ to 516¢; 55 1/4 in., 516¢ to 518¢; 55 1/2 in., 518¢ to 520¢; 55 3/4 in., 520¢ to 522¢; 56 in., 522¢ to 524¢; 56 1/4 in., 524¢ to 526¢; 56 1/2 in., 526¢ to 528¢; 56 3/4 in., 528¢ to 530¢; 57 in., 530¢ to 532¢; 57 1/4 in., 532¢ to 534¢; 57 1/2 in., 534¢ to 536¢; 57 3/4 in., 536¢ to 538¢; 58 in., 538¢ to 540¢; 58 1/4 in., 540¢ to 542¢; 58 1/2 in., 542¢ to 544¢; 58 3/4 in., 544¢ to 546¢; 59 in., 546¢ to 548¢; 59 1/4 in., 548¢ to 550¢; 59 1/2 in., 550¢ to 552¢; 59 3/4 in., 552¢ to 554¢; 60 in., 554¢ to 556¢; 60 1/4 in., 556¢ to 558¢; 60 1/2 in., 558¢ to 560¢; 60 3/4 in., 560¢ to 562¢; 61 in., 562¢ to 564¢; 61 1/4 in., 564¢ to 566¢; 61 1/2 in., 566¢ to 568¢; 61 3/4 in., 568¢ to 570¢; 62 in., 570¢ to 572¢; 62 1/4 in., 572¢ to 574¢; 62 1/2 in., 574¢ to 576¢; 62 3/4 in., 576¢ to 578¢; 63 in., 578¢ to 580¢; 63 1/4 in., 580¢ to 582¢; 63 1/2 in., 582¢ to 584¢; 63 3/4 in., 584¢ to 586¢; 64 in., 586¢ to 588¢; 64 1/4 in., 588¢ to 590¢; 64 1/2 in., 590¢ to 592¢; 64 3/4 in., 592¢ to 594¢; 65 in., 594¢ to 596¢; 65 1/4 in., 596¢ to 598¢; 65 1/2 in., 598¢ to 600¢; 65 3/4 in., 600¢ to 602¢; 66 in., 602¢ to 604¢; 66 1/4 in., 604¢ to 606¢; 66 1/2 in., 606¢ to 608¢; 66 3/4 in., 608¢ to 610¢; 67 in., 610¢ to 612¢; 67 1/4 in., 612¢ to 614¢; 67 1/2 in., 614¢ to 616¢; 67 3/4 in., 616¢ to 618¢; 68 in., 618¢ to 620¢; 68 1/4 in., 620¢ to 622¢; 68 1/2 in., 622¢ to 624¢; 68 3/4 in., 624¢ to 626¢; 69 in., 626¢ to 628¢; 69 1/4 in., 628¢ to 630¢; 69 1/2 in., 630¢ to 632¢; 69 3/4 in., 632¢ to 634¢; 70 in., 634¢ to 636¢; 70 1/4 in., 636¢ to 638¢; 70 1/2 in., 638¢ to 640¢; 70 3/4 in., 640¢ to 642¢; 71 in., 642¢ to 644¢; 71 1/4 in., 644¢ to 646¢; 71 1/2 in., 646¢ to 648¢; 71 3/4 in., 648¢ to 650¢; 72 in., 650¢ to 652¢; 72 1/4 in., 652¢ to 654¢; 72 1/2 in., 654¢ to 656¢; 72 3/4 in., 656¢ to 658¢; 73 in., 658¢ to 660¢; 73 1/4 in., 660¢ to 662¢; 73 1/2 in., 662¢ to 664¢; 73 3/4 in., 664¢ to 666¢; 74 in., 666¢ to 668¢; 74 1/4 in., 668¢ to 670¢; 74 1/2 in., 670¢ to 672¢; 74 3/4 in., 672¢ to 674¢; 75 in., 674¢ to 676¢; 75 1/4 in., 676¢ to 678¢; 75 1/2 in., 678¢ to 680¢; 75 3/4 in., 680¢ to 682¢; 76 in., 682¢ to 684¢; 76 1/4 in., 684¢ to 686¢; 76 1/2 in., 686¢ to 688¢; 76 3/4 in., 688¢ to 690¢; 77 in., 690¢ to 692¢; 77 1/4 in., 692¢ to 694¢; 77 1/2 in., 694¢ to 696¢; 77 3/4 in., 696¢ to 698¢; 78 in., 698¢ to 700¢; 78 1/4 in., 700¢ to 702¢; 78 1/2 in., 702¢ to 704¢; 78 3/4 in., 704¢ to 706¢; 79 in., 706¢ to 708¢; 79 1/4 in., 708¢ to 710¢; 79 1/2 in., 710¢ to 712¢; 79 3/4 in., 712¢ to 714¢; 80 in., 714¢ to 716¢; 80 1/4 in., 716¢ to 718¢; 80 1/2 in., 718¢ to 720¢; 80 3/4 in., 720¢ to 722¢; 81 in., 722¢ to 724¢; 81 1/4 in., 724¢ to 726¢; 81 1/2 in., 726¢ to 728¢; 81 3/4 in., 728¢ to 730¢; 82 in., 730¢ to 732¢; 82 1/4 in., 732¢ to 734¢; 82 1/2 in., 734¢ to 736¢; 82 3/4 in., 736¢ to 738¢; 83 in., 738¢ to 740¢; 83 1/4 in., 740¢ to 742¢; 83 1/2 in., 742¢ to 744¢; 83 3/4 in., 744¢ to 746¢; 84 in., 746¢ to 748¢; 84 1/4 in., 748¢ to 750¢; 84 1/2 in., 750¢ to 752¢; 84 3/4 in., 752¢ to 754¢; 85 in., 754¢ to 756¢; 85 1/4 in., 756¢ to 758¢; 85 1/2 in., 758¢ to 760¢; 85 3/4 in., 760¢ to 762¢; 86 in., 762¢ to 764¢; 86 1/4 in., 764¢ to 766¢; 86 1/2 in., 766¢ to 768¢; 86 3/4 in., 768¢ to 770¢; 87 in., 770¢ to 772¢; 87 1/4 in., 772¢ to 774¢; 87 1/2 in., 774¢ to 776¢; 87 3/4 in., 776¢ to 778¢; 88 in., 778¢ to 780¢; 88 1/4 in., 780¢ to 782¢; 88 1/2 in., 782¢ to 784¢; 88 3/4 in., 784¢ to 786¢; 89 in., 786¢ to 788¢; 89 1/4 in., 788¢ to 790¢; 89 1/2 in., 790¢ to 792¢; 89 3/4 in., 792¢ to 794¢; 90 in., 794¢ to 796¢; 90 1/4 in., 796¢ to 798¢; 90 1/2 in., 798¢ to 800¢; 90 3/4 in., 800¢ to 802¢; 91 in., 802¢ to 804¢; 91 1/4 in., 804¢ to 806¢; 91 1/2 in., 806¢ to 808¢; 91 3/4 in., 808¢ to 810¢; 92 in., 810¢ to 812¢; 92 1/4 in., 812¢ to 814¢; 92 1/2 in., 814¢ to 816¢; 92 3/4 in., 816¢ to 818¢; 93 in., 818¢ to 820¢; 93 1/4 in., 820¢ to 822¢; 93 1/2 in., 822¢ to 824¢; 93 3/4 in., 824¢ to 826¢; 94 in., 826¢ to 828¢; 94 1/4 in., 828¢ to 830¢; 94 1/2 in., 830¢ to 832¢; 94 3/4 in., 832¢ to 834¢; 95 in., 834¢ to 836¢; 95 1/4 in., 836¢ to 838¢; 95 1/2 in., 838¢ to 840¢; 95 3/4 in., 840¢ to 842¢; 96 in., 842¢ to 844¢; 96 1/4 in., 844¢ to 846¢; 96 1/2 in., 846¢ to 848¢; 96 3/4 in., 848¢ to 850¢; 97 in., 850¢ to 852¢; 97 1/4 in., 852¢ to 854¢; 97 1/2 in., 854¢ to 856¢; 97 3/4 in., 856¢ to 858¢; 98 in., 858¢ to 860¢; 98 1/4 in., 860¢ to 862¢; 98 1/2 in., 862¢ to 864¢; 98 3/4 in., 864¢ to 866¢; 99 in., 866¢ to 868¢; 99 1/4 in., 868¢ to 870¢; 99 1/2 in., 870¢ to 872¢; 99 3/4 in., 872¢ to 874¢; 100 in., 874¢ to 876¢; 100 1/4 in., 876¢ to 878¢; 100 1/2 in., 878¢ to 880¢; 100 3/4 in., 880¢ to 882¢; 101 in., 882¢ to 884¢; 101 1/4 in., 884¢ to 886¢; 101 1/2 in., 886¢ to 888¢; 101 3/4 in., 888¢ to 890¢; 102 in., 890¢ to 892¢; 102 1/4 in., 892¢ to 894¢; 102 1/2 in., 894¢ to 896¢; 102 3/4 in., 896¢ to 898¢; 103 in., 898¢ to 900¢; 103 1/4 in., 900¢ to 902¢; 103 1/2 in., 902¢ to 904¢; 103 3/4 in., 904¢ to 906¢; 104 in., 906¢ to 908¢; 104 1/4 in., 908¢ to 910¢; 104 1/2 in., 910¢ to 912¢; 104 3/4 in., 912¢ to 914¢; 105 in., 914¢ to 916¢; 105 1/4 in., 916¢ to 918¢; 105 1/2 in., 918¢ to 920¢; 105 3/4 in., 920¢ to 922¢; 106 in., 922¢ to 924¢; 106 1/4 in., 924¢ to 926¢; 106 1/2 in., 926¢ to 928¢; 106 3/4 in., 928¢ to 930¢; 107 in., 930¢ to 932¢; 107 1/4 in., 932¢ to 934¢; 107 1/2 in., 934¢ to 936¢; 107 3/4 in., 936¢ to 938¢; 108 in., 938¢ to 940¢; 108 1/4 in., 940¢ to 942¢; 108 1/2 in., 942¢ to 944¢; 108 3/4 in., 944¢ to 946¢; 109 in., 946¢ to 948¢; 109 1/4 in., 948¢ to 950¢; 109 1/2 in., 950¢ to 952¢; 109 3/4 in., 952¢ to 954¢; 110 in., 954¢ to 956¢; 110 1/4 in., 956¢ to 958¢; 110 1/2 in., 958¢ to 960¢; 110 3/4 in., 960¢ to 962¢; 111 in., 962¢ to 964¢; 111 1/4 in., 964¢ to 966¢; 111 1/2 in., 966¢ to 968¢; 111 3/4 in., 968¢ to 970¢; 112 in., 970¢ to 972¢; 112 1/4 in., 972¢ to 974¢; 112 1/2 in., 974¢ to 976¢; 112 3/4 in., 976¢ to 978¢; 113 in., 978¢ to 980¢; 113 1/4 in., 980¢ to 982¢; 113 1/2 in., 982¢ to 984¢; 113 3/4 in., 984¢ to 986¢; 114 in., 986¢ to 988¢; 114 1/4 in., 988¢ to 990¢; 114 1/2 in., 990¢ to 992¢; 114 3/4 in., 992¢ to 994¢; 115 in., 994¢ to 996¢; 115 1/4 in., 996¢ to 998¢; 115 1/2 in., 998¢ to 1000¢; 115 3/4 in., 1000¢ to 1002¢; 116 in., 1002¢ to 1004¢; 116 1/4 in., 1004¢ to 1006¢; 116 1/2 in., 1006¢ to 1008¢; 116 3/4 in., 1008¢ to 1010¢; 117 in., 1010¢ to 1012¢; 117 1/4 in., 1012¢ to 1014¢; 117 1/2 in., 1014¢ to 1016¢; 117 3/4 in., 1016¢ to 1018¢; 118 in., 1018¢ to 1020¢; 118 1/4 in., 1020¢ to 1022¢; 118 1/2 in., 1022¢ to 1024¢; 118 3/4 in., 1024¢ to 1026¢; 119 in., 1026¢ to 1028¢; 119 1/4 in., 1028¢ to 1030¢; 119 1/2 in., 1030¢ to 1032¢; 119 3/4 in., 1032¢ to 1034¢; 120 in., 1034¢ to 1036¢; 120 1/4 in., 1036¢ to 1038¢; 120 1/2 in., 1038¢ to 1040¢; 120 3/4 in., 1040¢ to 1042¢; 121 in., 1042¢ to 1044¢; 121 1/4 in., 1044¢ to 1046¢; 121 1/2 in., 1046¢ to 1048¢; 121 3/4 in., 1048¢ to 1050¢; 122 in., 1050¢ to 1052¢; 122 1/4 in., 1052¢ to 1054¢; 122 1/2 in., 1054¢ to 1056¢; 122 3/4 in., 1056¢ to 1058¢; 123 in., 1058¢ to 1060¢; 123 1/4 in., 1060¢ to 1062¢; 123 1/2 in., 1062¢ to 1064¢; 123 3/4 in., 1064¢ to 1066¢; 124 in., 1066¢ to 1068¢; 124 1/4 in., 1068¢ to 1070¢; 124 1/2 in., 1070¢ to 1072¢; 124 3/4 in., 1072¢ to 1074¢; 125 in., 1074¢ to 1076¢; 125 1/4 in., 1076¢ to 1078¢; 125 1/2 in., 1078¢ to 1080¢; 125 3/4 in., 1080¢ to 1082¢; 126 in., 1082¢ to 1084¢; 126 1/4 in., 1084¢ to 1086¢; 126 1/2 in., 1086¢ to 1088¢; 126 3/4 in., 1088¢ to 1090¢; 127 in., 1090¢ to 1092¢; 127 1/4 in., 1092¢ to 1094¢; 127 1/2 in., 1094¢ to 1096¢; 127 3/4 in., 1096¢ to 1098¢; 128 in., 1098¢ to 1100¢; 128 1/4 in., 1100¢ to 1102¢; 128 1/2 in., 1102¢ to 1104¢; 128 3/4 in., 1104¢ to 1106¢; 129 in., 1106¢ to 1108¢; 129 1/4 in., 1108¢ to 1110¢; 129 1/2 in., 1110¢ to 1112¢; 129 3/4 in., 1112¢ to 1114¢; 130 in., 1114¢ to 1116¢; 130 1/4 in., 1116¢ to 1118¢; 130 1/2 in., 1118¢ to 1

MARKETS—PRICES—TRENDS



SCRAP

Iron & Steel

Railroad Items and Cast Grades Climb

Under the narcotic influence of formula prices, steelmaking grades stayed quiet but items of other scrap groups hit the road up. There were some signals that the mills' grip on prices is being shaken. In Pittsburgh scrap sources are showing signs of drying up at formula front prices and consumers are pressing brokers for delivery on older, lower-priced orders. On the other hand dealers are withholding large tonnages.

Birmingham saw a market with strength in most directions. No. 1 heavy moved to \$36.00 to \$37.00 from a previous top of \$35.00 and No. 2 advanced \$2.00 to \$33.00 to \$34.00. No. 1 heavy melting at St. Louis went up a notch to \$40.00 to \$41.00.

It is probably true in all centers that dealers are not too anxious to trade on the steelmaking grades because of an expectancy that formula prices will be abolished.

Railroad specialties scored big gains in Pittsburgh, Chicago, Cleveland, Philadelphia, Cincinnati—ranging up to \$5.00. The cast grades, very strong, continued up in large and small cen-

ters. No. 1 machinery cast advanced \$1.00 to a top of \$54.00 in Pittsburgh.

PITTSBURGH—With scrap sources showing signs of drying up at formula prices, the consumer here is building a fire under brokers for completion of old, lower-priced orders—as low as \$32.00 on No. 1 heavy melting. Brokers were advised by mail to apply at least 50 pct of current shipments to these old orders on all grades of scrap. If this is not done voluntarily, invoices will be adjusted accordingly. Meanwhile, dealers are reluctant to let go of large tonnages, evidently feeling that higher-than-formula prices will be obtainable in view of approaching winter, the high scrap melt and the possibility of an iron ore shortage next spring. No. 1 heavy melting remained unchanged at \$44.00, but the railroad list, on appraisal, and cast grades are very strong. No. 2 steel was up \$1.50 on a sale, and machine shop turnings were 50¢ higher.

CHICAGO—There was little activity in the Chicago area market during the past week. Mills seem determined to hold formula prices at present levels and at press time no reports of new sales had been made. However, reliable sources indicated that a major consumer was expected to come into the market this week. Brokers are having difficulty filling present orders for No. 1 and No. 2 heavy melting steel. Meanwhile railroad items are bringing higher prices.

PHILADELPHIA—There is much speculation in this area as whether or not the price formula will crack in the rear future. Thus far it has not. Low phos, RR specialties, crop rails, and cast grades are all \$1.00 to \$4.00 a ton higher this week. Demand is strong and steady, with the

mills in a good inventory position but buying to prevent any great drop in inventory with the coming cold weather.

NEW YORK—Cast grades showed that they had been mustering strength for a surge upward while resting at high levels for the past several weeks. Under the spur of demand, cast grades bounded upward \$3.00 and \$3.50 and threatened further advances. Steelmaking grades remained under the yoke of mill formula prices but it was reported that a New Jersey consumer had paid up to \$39.00 for No. 1 heavy melting.

DETROIT—While prices of steel scrap continue to stand still under the concerted influence of mill buyers, cast iron grades are running wild. Many local scrap sources believe the upward spiral in cast grades reflects both the underlying strength of the market and stimulation created by a recent advance in the price of pig iron. Meanwhile, there is little evidence of dealer resistance to present steel prices although some dealers are reported to be holding on to cast iron scrap, apparently hoping to get higher prices.

CLEVELAND—Formula prices are being tested here and in the valley this week. Tonnage is tight at the formula and reports of upgrading are rather numerous. The major mills are getting all they want at the formula from their big consumers. As a result they have plenty of inventory and would probably pull out of this market were it not for winter. On the other hand, their daily activities in the market are responsible for a certain amount of its strength.

ST. LOUIS—Malleable scrap has become a scarce item because railroads are not producing it, with the result the price has jumped \$8.00 a ton, and brokers have orders to buy at any price. Shortage of foundry grades has caused some factors to buy No. 1 heavy melting which is up \$1.00 a ton. Sales of No. 2 bundled sheets were \$1.00 higher. A steel mill bought a small quantity of No. 2 heavy melting steel at unchanged price.

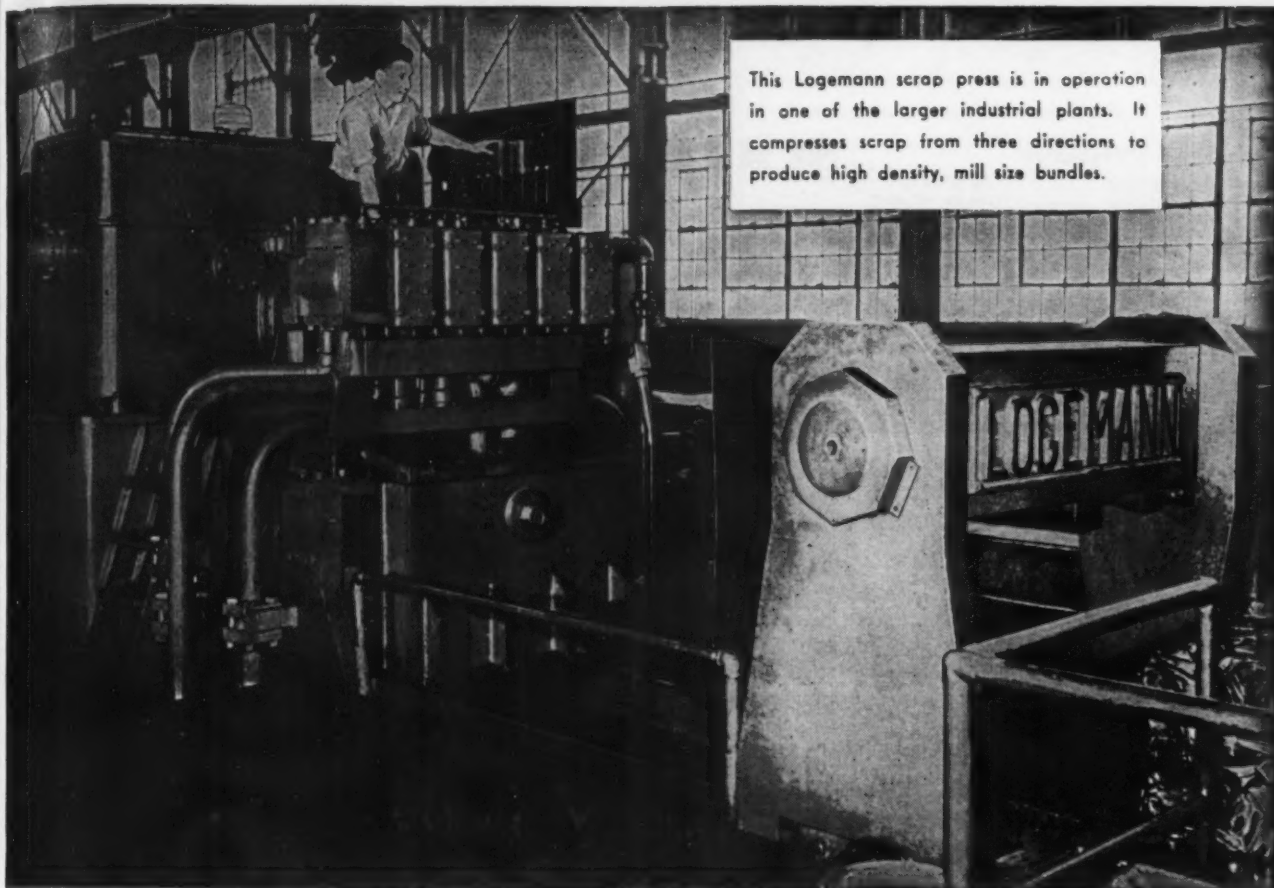
CINCINNATI—Prices are unsteady in a strong and active scrap market here. Everybody needs scrap and demand tops supply by a wide margin. Some brokers, despite the trend, are making an effort to reduce their buying prices on major open-hearth grades \$1.00. Other brokers are trying to buy at quoted prices and finding dealers willing to sell only small tonnages, carloads, and sales of this size are keeping the market active.

BOSTON—A highly satisfactory market developed here this week with most sides happy. No. 1 stayed at \$32.50 but a good many others were up 50¢. Cast, which made big gains for three weeks to last week has remained firm at \$38.00 to \$39.00.

BIRMINGHAM—Efforts of scrap buyers and brokers in the district to resist price increases boomeranged on them this week, with the result that prices in most categories zoomed upward. Not too much scrap moved into the district and what did arrive was grabbed by mills as fast as received.

BUFFALO—Steadiness gripped the scrap market at prevailing formula prices. Dealers continued to ship against old orders as new business in all items was virtually nil. The market took on a more even tone when a willingness was expressed to accept additional orders at present prices.

This Logemann scrap press is in operation in one of the larger industrial plants. It compresses scrap from three directions to produce high density, mill size bundles.



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The compact unit illustrated is completely self-contained with oil tank and pump located directly over the press . . . utilizing the advantages of short pipe lines. Automatic controls, mounted in front of pump, give the operator full visibility at all times. Controls operate rams successively within a single rigid box. There is no complex construction which means there is no need for specially-trained maintenance crews.

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LOGEMANN BROTHERS COMPANY
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Iron and Steel

SCRAP PRICES

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	\$43.50 to \$44.00
No. 2 hvy. melting	40.50 to 41.00
No. 1 bundles	45.50 to 46.00
No. 2 bundles	38.50 to 39.00
Machine shop turn.	34.00 to 34.50
Mixed bor. and ms. turns.	34.50 to 35.00
Shoveling turnings	37.50 to 38.00
Cast iron borings	36.50 to 37.00
Low phos. plate	49.50 to 50.00
Heavy turnings	42.50 to 43.00
No. 1 RR. hvy. melting	44.00 to 45.00
Scrap rails, random lgth.	57.50 to 58.00
Rails 2 ft and under	60.00 to 61.00
RR. steel wheels	55.00 to 56.00
RR. spring steel	55.00 to 56.00
RR. couplers and knuckles	55.00 to 56.00
No. 1 machinery cast.	53.50 to 54.00
Mixed yard cast.	48.50 to 49.00
Heavy breakable cast.	44.50 to 45.00
Malleable	62.00 to 63.00

Chicago

No. 1 hvy. melting	\$39.50 to \$40.00
No. 2 hvy. melting	37.50 to 38.00
No. 1 factory bundles	39.50 to 40.00
No. 1 dealers' bundles	39.50 to 40.00
No. 2 dealers' bundles	34.00 to 35.00
Machine shop turn.	31.00 to 32.00
Mixed bor. and turn.	31.00 to 32.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	32.00 to 33.00
Low phos. forge crops	49.00 to 50.00
Low phos. plate	48.00 to 49.00
No. 1 RR. hvy. melting	43.50 to 44.50
Scrap rails, random lgth.	58.00 to 59.00
Rerolling rails	63.00 to 64.00
Rails 2 ft and under	62.00 to 63.00
Locomotive tires, cut	54.00 to 55.00
Cut bolsters & side frames	48.00 to 49.00
Angles and splice bars	59.00 to 60.00
RR. steel car axles	78.00 to 80.00
RR. couplers and knuckles	50.00 to 51.00
No. 1 machinery cast.	50.00 to 51.00
No. 1 agricul. cast.	46.00 to 47.00
Heavy breakable cast.	38.00 to 39.00
RR. grate bars	38.00 to 39.00
Cast iron brake shoes	46.00 to 47.00
Cast iron car wheels	48.00 to 49.00
Malleable	58.00 to 60.00

Philadelphia

No. 1 hvy. melting	\$38.00 to \$39.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	31.00 to 32.00
Machine shop turn.	27.00 to 28.00
Mixed bor. and turn.	25.00 to 26.00
Shoveling turnings	32.00 to 33.00
Low phos. punchings, plate	46.00 to 47.00
Low phos. 5 ft and under	45.00 to 46.00
Low phos. bundles	43.00 to 44.00
Hvy. axle forge turn.	38.00 to 39.00
Clean cast chem. borings	39.00 to 40.00
RR. steel wheels	48.00 to 49.00
RR. spring steel	48.00 to 49.00
Rails 18 in. and under	58.00 to 60.00
No. 1 machinery cast.	50.00 to 51.00
Mixed yard cast.	44.00 to 45.00
Heavy breakable cast.	44.00 to 45.00
Cast iron carwheels	51.00 to 52.00
Malleable	55.00 to 57.00

Cleveland

No. 1 hvy. melting	\$43.00 to \$43.50
No. 2 hvy. melting	40.00 to 40.50
No. 1 busheling	43.00 to 43.50
No. 1 bundles	43.00 to 43.50
No. 2 bundles	28.00 to 28.50
Machine shop turn.	35.00 to 35.50
Mixed bor. and turn.	36.00 to 36.50
Shoveling turnings	37.00 to 37.50
Cast iron borings	37.00 to 37.50
Low phos. 2 ft and under	45.50 to 46.00
Steel axle turn.	43.00 to 43.50
Drop forge flashings	43.00 to 43.50
No. 1 RR. hvy. melting	43.50 to 44.00
Rails 3 ft and under	65.00 to 66.00
Rails 18 in. and under	66.00 to 67.00
No. 1 machinery cast.	62.00 to 63.00
RR. cast	62.00 to 63.00
RR. grate bars	45.00 to 46.00
Stove plate	50.00 to 51.00
Malleable	66.00 to 67.00

Youngstown

No. 1 hvy. melting	\$43.50 to \$44.00
No. 2 hvy. melting	40.50 to 41.00
No. 1 bundles	43.50 to 44.00

No. 2 bundles	\$38.50 to \$39.00
Machine shop turn.	35.50 to 36.00
Shoveling turnings	37.50 to 38.00
Cast iron borings	37.50 to 38.00
Low phos. plate	46.00 to 46.50

Buffalo

No. 1 hvy. melting	\$41.00 to \$42.00
No. 2 hvy. melting	37.50 to 38.50
No. 1 busheling	37.50 to 38.50
No. 1 bundles	39.50 to 40.00
No. 2 bundles	36.00 to 36.50
Machine shop turn.	31.50 to 32.50
Mixed bor. and turn.	31.50 to 32.50
Shoveling turnings	33.50 to 34.50
Cast iron borings	31.50 to 32.50
Low phos. plate	42.00 to 43.00
Scrap rails, random lgth.	44.00 to 45.00
Rails 2 ft and under	48.00 to 50.00
RR. steel wheels	47.00 to 48.00
RR. spring steel	47.00 to 48.00
RR. couplers and knuckles	47.00 to 48.00
No. 1 machinery cast.	46.00 to 47.00
No. 1 cupola cast.	42.00 to 43.00
Small indus. malleable	48.00 to 50.00

Birmingham

No. 1 hvy. melting	\$36.00 to \$37.00
No. 2 hvy. melting	33.00 to 34.00
No. 2 bundles	31.00 to 32.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	27.00 to 28.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	25.00 to 26.00
Bar crops and plate	44.00 to 45.00
Structural and plate	44.00 to 45.00
No. 1 RR. hvy. melting	41.00 to 42.00
Scrap rails, random lgth.	43.00 to 44.00
Rerolling rails	55.00 to 56.00
Rails 2 ft and under	55.00 to 56.00
Angles & splice bars	54.00 to 55.00
Std. steel axles	59.00 to 60.00
No. 1 cupola cast.	54.00 to 55.00
Stove plate	48.00 to 49.00
Cast iron carwheels	40.00 to 41.00

St. Louis

No. 1 hvy. melting	\$40.00 to \$41.00
No. 2 hvy. melting	36.00 to 37.00
No. 2 bundled sheets	35.00 to 36.00
Machine shop turn.	27.50 to 28.50
Shoveling turnings	30.00 to 31.00
Rails, random lengths	50.00 to 51.00
Rails 3 ft and under	56.00 to 58.00
Locomotive tires, uncut	47.00 to 48.00
Angles and splice bars	54.00 to 55.00
Std. steel car axles	76.00 to 78.00
RR. spring steel	49.00 to 50.00
No. 1 machinery cast.	47.00 to 48.00
Hvy. breakable cast.	40.00 to 42.00
Cast iron brake shoes	45.00 to 46.00
Stove plate	40.00 to 41.00
Cast iron car wheels	48.00 to 49.00
Malleable	58.00 to 60.00

New York

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$34.00 to \$34.50
No. 2 hvy. melting	29.00 to 30.00
No. 2 bundles	28.00 to 28.50
Machine shop turn.	23.50 to 24.50
Mixed bor. and turn.	23.50 to 24.50
Shoveling turnings	26.00 to 27.00
Clean cast chem. bor.	34.50 to 35.50
No. 1 machinery cast.	39.00 to 40.00
Mixed yard cast.	37.50 to 38.50
Charging box cast.	37.50 to 38.50
Heavy breakable cast.	37.50 to 38.50
Unstrp. motor blocks	32.00 to 33.00

Boston

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$32.50
No. 2 hvy. melting	\$27.50 to 28.00
No. 1 bundles	32.50

No. 2 bundles	\$26.50 to \$27.00
Machine shop turn.	23.00 to 23.50
Mixed bor. and turn.	22.50 to 23.00
Shoveling turnings	25.00 to 25.50
No. 1 busheling	31.50 to 32.00
Clean cast chem. borings	29.00 to 30.00
No. 1 machinery cast.	38.00 to 39.00
Mixed cupola cast.	34.00 to 34.50
Heavy breakable cast.	32.00 to 32.50
Stove plate	32.00 to 32.50

Detroit

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$37.00 to \$37.50
No. 2 hvy. melting	30.00 to 31.00
No. 1 bundles	37.00 to 37.50
New busheling	37.00 to 37.50
Flashings	37.00 to 37.50
Machine shop turn.	29.00 to 29.50
Mixed bor. and turn.	29.00 to 29.50
Shoveling turnings	31.00 to 31.50
Cast iron borings	31.00 to 31.50
Low phos. plate	39.00 to 40.00
No. 1 cupola cast.	47.50 to 50.00
Heavy breakable cast.	40.00 to 42.00
Stove plate	42.00 to 43.00
Automotive cast.	52.00 to 53.00

Cincinnati

Per gross ton, f.o.b. cars:	
No. 1 hvy. melting	\$42.50 to \$43.00
No. 2 hvy. melting	37.50 to 38.00
No. 1 bundles	42.50 to 43.00
No. 2 bundles, black	37.50 to 38.00
No. 2 bundles, mixed	27.50 to 28.00
Machine shop turn.	26.50 to 27.00
Mixed bor. and turn.	28.50 to 29.00
Shoveling turnings	29.50 to 30.00
Cast iron borings	29.50 to 30.00
Low phos. 18 in. under	54.00 to 55.00
Rails, random lengths	57.00 to 58.00
Rails, 18 in. and under	65.50 to 66.50
No. 1 cupola cast.	56.50 to 57.50
Hvy. breakable cast.	46.00 to 47.00
Drop broken cast.	59.00 to 60.00

San Francisco

No. 1 hvy. melting	\$26.50
No. 2 hvy. melting	24.50
No. 1 bundles	26.50
No. 2 bundles	22.50
No. 3 bundles	19.50
Machine shop turn.	13.00
Elec. fur. 1 ft and under	40.00
No. 1 RR. hvy. melting	26.50
Scrap rails, random lgth.	26.50
No. 1 cupola cast.	\$43.00 to 46.00

Los Angeles

No. 1 hvy. melting	\$26.50
No. 2 hvy. melting	24.50
No. 1 bundles	26.50
No. 2 bundles	22.50
No. 3 bundles	19.50
Mach. shop turn.	13.00
Elec. fur. 1 ft and under	42.00
No. 1 RR. hvy. melting	26.50
Scrap rails, random lgth.	26.50
No. 1 cupola cast.	\$46.00 to 48.00

Seattle

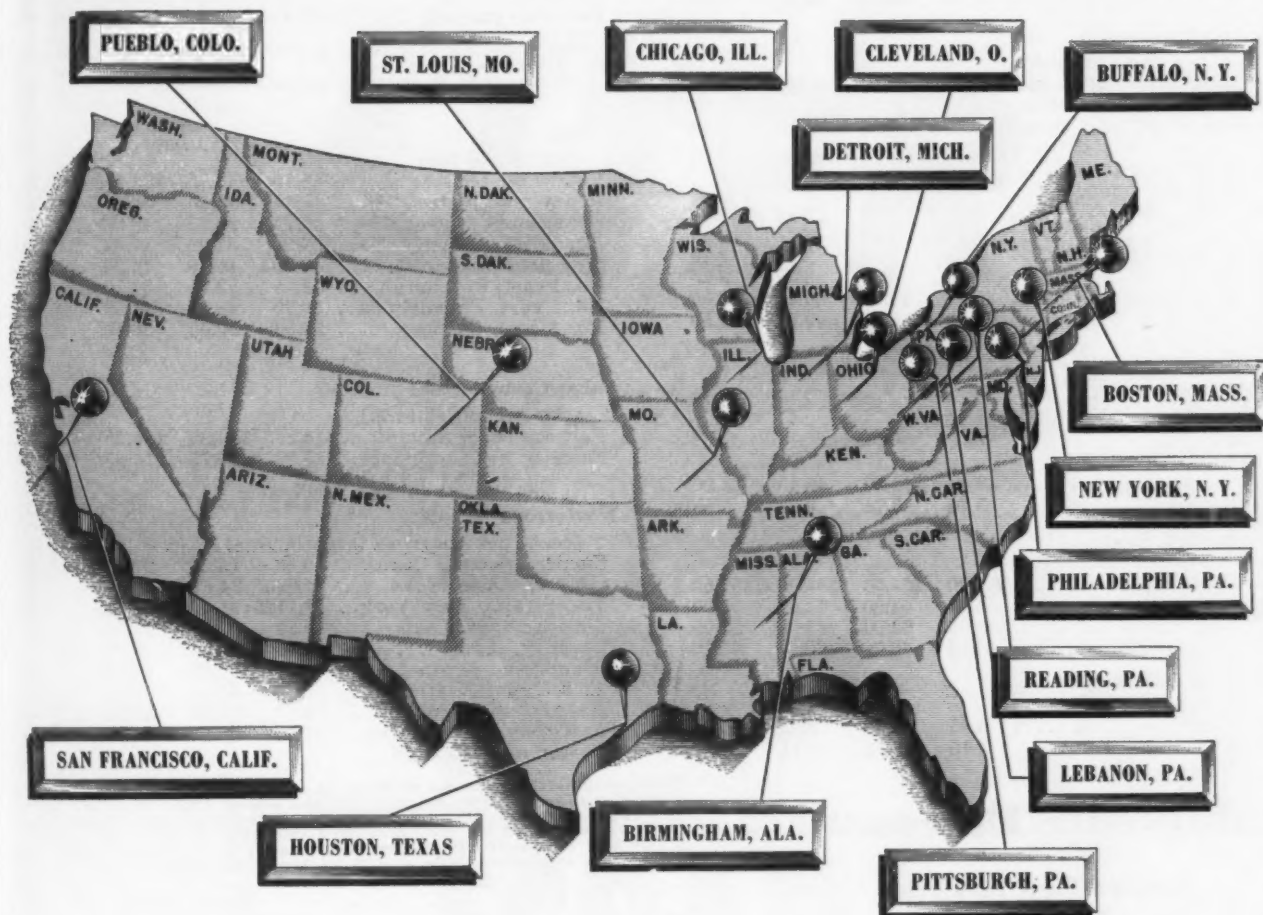
No. 1 hvy. melting	\$24.00
No. 2 hvy. melting	24.00
No. 1 bundles	22.00
No. 2 bundles	22.00
No. 3 bundles	18.00
Elec. fur. 1 ft and under	\$29.00 to 30.00
RR. hvy. melting	25.00
No. 1 cupola cast	35.00
Heavy breakable cast.	25.00

Hamilton, Ont.

No. 1 hvy. melting	\$30.00
No. 1 bundles	30.00
No. 2 bundles	29.50
Mechanical bundles	28.00
Mixed steel scrap	26.00
Mixed bor. and turn.	23.00
Rails, remelting	30.00
Rails, rerolling	33.00
Bushelings	24.50
Bush., new fact. prep'd.	29.00
Bush., new fact. unprep'd.	23.00
Short steel turnings	23.00
Cast scrap	45.00

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

October 12, 1950

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Comparison of Prices

Steel prices in this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel	Oct. 10, 1950	Oct. 3, 1950	Sept. 12, 1950	Oct. 11, 1949
(cents per pound)				
Hot-rolled sheets	3.35	3.35	3.35	3.25
Cold-rolled sheets	4.10	4.10	4.10	4.00
Galvanized sheets (10 ga)	4.40	4.40	4.40	4.40
Hot-rolled strip	3.25	3.25	3.25	3.25
Cold-rolled strip	4.21	4.21	4.21	4.038
Plate	3.50	3.50	3.50	3.40
Plates wrought iron	7.85	7.85	7.85	7.85
Stains C-R strip (No. 302)	34.50	34.50	34.50	33.00

Tin and Terneplate:

(dollars per base box)				
Tinplate (1.50 lb) cokes	\$7.50	\$7.50	\$7.50	\$7.75
Tinplate, electro (0.50 lb)	6.60	6.60	6.60	6.70
Special coated mfg. ternes	6.35	6.35	6.35	6.65

Bars and Shapes:

(cents per pound)				
Merchant bars	3.45	3.45	3.45	3.35
Cold-finished bars	4.145	4.145	4.145	3.995
Alloy bars	3.95	3.95	3.95	3.75
Structural shapes	3.40	3.40	3.40	3.25
Stainless bars (No. 302)	30.00	30.00	30.00	28.50
Wrought iron bars	9.50	9.50	9.50	9.50

Wire:

(cents per pound)				
Bright wire	4.50	4.50	4.50	4.15

Rails:

(dollars per 100 lb)				
Heavy rails	\$3.40	\$3.40	\$3.40	\$3.20
Light rails	3.75	3.75	3.75	3.55

Semifinished Steel:

(dollars per net ton)				
Rerolling billets	\$54.00	\$54.00	\$54.00	\$52.00
Slabs, rerolling	54.00	54.00	54.00	52.00
Forging billets	63.00	63.00	63.00	61.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	63.00

Wire Rod and Skelp:

(cents per pound)				
Wire rods	3.85	3.85	3.85	3.40
Skelp	3.15	3.15	3.15	3.25

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Pig Iron:	Oct. 10, 1950	Oct. 3, 1950	Sept. 12, 1950	Oct. 11, 1949
(per gross ton)				
No. 2, foundry, del'd Phila.	\$51.76	\$51.76	\$51.76	\$50.42
No. 2, Valley furnace	49.50	49.50	46.50	46.50
No. 2, Southern Cin'ti	52.58	52.58	49.08	46.08
No. 2, Birmingham	45.88	45.88	42.38	39.38
No. 2, foundry, Chicago†	49.50	49.50	46.50	46.50
Basic del'd Philadelphia	50.92	50.92	50.92	49.92
Basic, Valley furnace	49.00	49.00	46.00	46.00
Malleable, Chicago†	49.50	49.50	46.50	46.50
Malleable, Valley	49.50	49.50	46.50	46.50
Charcoal, Chicago	70.56	70.56	68.56	68.56
Ferromanganese†	173.40	173.40	173.40	173.40

†The switching charge for delivery to foundries in the Chicago district is \$1 per ton.

‡Average of U. S. prices quoted on Ferroalloy page.

Scrap:

(per gross ton)				
Heavy melt'g steel, P'gh.	\$43.75	\$43.75	\$43.75	\$29.75
Heavy melt'g steel, Phila.	38.50	38.50	38.50	24.50
Heavy melt'g steel, Ch'go	39.75	39.75	40.00	25.50
No. 1 hy. com. sh't, Det.	37.25	37.25	37.50	19.50
Low phos. Young'n.	46.25	46.25	46.25	31.75
No. 1 cast, Pittsburgh	53.75	52.75	51.75	39.50
No. 1 cast, Philadelphia	50.50	48.50	44.50	35.50
No. 1 cast, Chicago	50.50	50.50	50.50	40.50

Coke: Connellsville:

(per net ton at oven)				
Furnace coke, prompt	\$14.25	\$14.25	\$14.25	\$14.25
Foundry coke, prompt	16.75	16.75	16.25	15.75

Nonferrous Metals:

(cents per pound to large buyers)				
Copper, electro, Conn.	24.50	24.50	23.80	17.625
Copper, Lake, Conn.	24.625	24.625	24.625	17.75
Tin, Straits, New York	\$1.1125†	\$1.0575*	1.015	96.00
Zinc, East St. Louis	17.50	17.50	17.50	9.25
Lead, St. Louis	15.80	15.80	15.80	13.60
Aluminum, virgin	19.00	19.00	17.50	17.00
Nickel, electrolytic	51.22	51.22	51.22	42.97
Magnesium, ingot	24.50	24.50	22.50	20.50
Antimony, Laredo, Tex.	32.00	32.00	32.00	32.00

†Tentative. *Revised.

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 139 of May 12, 1949, issue.)

Composite Prices

Finished Steel Base Price

Oct. 10, 1950	3.837¢ per lb.
One week ago	3.837¢ per lb.
One month ago	3.837¢ per lb.
One year ago	3.705¢ per lb.

	High	Low
1950...	3.837¢ Jan. 3	3.837¢ Jan. 3
1949...	3.837¢ Dec. 27	3.3705¢ May 3
1948...	3.721¢ July 27	3.193¢ Jan. 1
1947...	3.193¢ July 29	2.848¢ Jan. 1
1946...	2.848¢ Dec. 31	2.464¢ Jan. 1
1945...	2.464¢ May 29	2.396¢ Jan. 1
1944...	2.396¢	2.396¢
1943...	2.396¢	2.396¢
1942...	2.396¢	2.396¢
1941...	2.396¢	2.396¢
1940...	2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939...	2.35367¢ Jan. 3	2.26689¢ May 16
1938...	2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937...	2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936...	2.32263¢ Dec. 28	2.05200¢ Mar. 10
1935...	2.07542¢ Oct. 1	2.06492¢ Jan. 8
1932...	1.89196¢ July 5	1.83910¢ Mar. 1
1929...	2.31773¢ May 28	2.26498¢ Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips, representing major portion of finished steel shipment. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

Pig Iron

....\$49.19 per gross ton....
.... 49.19 per gross ton....
.... 46.61 per gross ton....
.... 45.88 per gross ton....

High

\$49.19 Oct. 3	\$45.88 Jan. 3
46.87 Jan. 18	45.88 Sept. 6
46.91 Oct. 12	39.58 Jan. 6
37.98 Dec. 30	30.14 Jan. 7
30.14 Dec. 10	25.37 Jan. 1
25.37 Oct. 23	23.61 Jan. 2
\$23.61	\$23.61
23.61	23.61
23.61	23.61
\$23.61 Mar. 20	\$23.45 Jan. 2
23.45 Dec. 23	22.61 Jan. 2
22.61 Sept. 19	20.61 Sept. 12
23.25 June 21	19.61 July 6
32.25 Mar. 9	20.25 Feb. 16
19.74 Nov. 24	18.73 Aug. 11
18.84 Nov. 5	17.83 May 14
14.81 Jan. 5	13.56 Dec. 6
18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Scrap Steel

.....\$40.67 per gross ton.....
..... 40.67 per gross ton.....
..... 40.75 per gross ton.....
..... 26.58 per gross ton.....

High

\$41.58 Aug. 22	\$26.25 Jan. 3
43.00 Jan. 4	19.33 June 28
43.16 July 27	39.75 Mar. 9
42.58 Oct. 28	29.50 May 20
31.17 Dec. 24	19.17 Jan. 1
19.17 Jan. 2	18.92 May 22
19.17 Jan. 11	15.76 Oct. 24
\$19.17	\$19.17
19.17	19.17
\$22.00 Jan. 7	\$19.17 Apr. 10
21.83 Dec. 30	16.04 Apr. 9
22.50 Oct. 3	14.08 May 16
15.00 Nov. 22	11.00 June 7
21.92 Mar. 30	12.67 June 9
17.75 Dec. 21	12.67 June 8
13.42 Dec. 10	10.33 Apr. 29
8.50 Jan. 12	6.43 July 5
17.58 Jan. 29	14.08 Dec. 8

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

ALTER

A NAME TO REMEMBER

IRON AND STEEL

SCRAP

ALL GRADES OF STAINLESS and ALLOY

SCRAP

Over 50 Years

ALTER
C O M P A N Y

1700 ROCKINGHAM ROAD DAVENPORT 2, IOWA

Cast Iron
Electric Furnace Grades
Open Hearth
Foundry Steel
Sheet Iron for Baling
Stainless Steel
Non-Ferrous Metals

October 12, 1950

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IRON AGE STEEL PRICES	Smaller numbers in price boxes indicate producing companies. For main office locations, see key on facing page. Base prices at producing points apply only to sizes and grades produced in these areas. Prices are in cents per lb unless otherwise noted. Extras apply.													
	Pittsburgh	Chicago	Gary	Cleveland	Canton Massillon	Middle- town	Youngs- town	Bethle- hem	Buffalo	Consho- hocken	Johns- town	Spar- rows Point	Granite City	Detroit
INGOTS Carbon forging, net ton	\$50.00 ¹													\$50.00 ¹
Alloy, net ton	\$51.00 ¹⁻¹⁷													\$51.00 ¹
BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton	\$53.00 ¹	\$53.00 ¹	\$53.00 ¹				\$57.00 ^{1,3}		\$53.00 ³	\$62.00 ^{2,6}	\$53.00 ³			
Carbon forging billets, net ton	\$63.00 ¹	\$63.00 ¹⁻⁴	\$63.00 ¹⁻⁸	\$63.00 ⁴			\$63.00 ^{2,5}		\$63.00 ³⁻⁴	\$68.00 ^{2,6}	\$63.00 ³			\$68.00 ¹
Alloy, net ton	\$66.00 ¹⁻¹⁷	\$66.00 ¹⁻⁴	\$66.00 ¹		\$66.00 ⁴⁻⁴²		\$66.00 ^{1,3}	\$66.00 ³	\$66.00 ³⁻⁴	\$70.00 ^{2,6}	\$66.00 ³			\$69.00 ¹
PIPE SKELP	3.15 ¹						3.15 ¹⁻⁴							
WIRE RODS	3.85 ² 4.05 ^{1,8}	3.85 ^{2-4,23}	3.85 ²	3.85 ²			3.85 ²				3.85 ²	3.95 ³		
SHEETS Hot-rolled (18 ga. & hvr.)	3.35 ^{1-5,9-15}	3.35 ^{2,3}	3.35 ^{1-8,9}	3.35 ⁴⁻⁵			3.35 ¹⁻⁴⁻⁶ 3.75 ^{1,3}		3.35 ²	3.60 ^{2,6}		3.35 ³	4.05 ^{2,3}	3.55 ^{1,2} 4.15 ^{4,7}
Cold-rolled	4.10 ^{1-5,7-9-15} 5.10 ^{4,5}		4.10 ^{1-6,8}	4.10 ⁴⁻¹⁵		4.10 ⁷	4.10 ⁴⁻⁶		4.10 ³			4.10 ³	4.80 ^{2,3}	4.30 ^{1,2}
Galvanized (10 gage)	4.40 ¹⁻⁹⁻¹⁵		4.40 ¹⁻⁸		4.40 ⁴		4.75 ^{4,4} 5.50 ^{4,4}					4.40 ³		
Enameling (12 gage)	4.40 ¹		4.40 ¹⁻⁸	4.40 ⁴		4.40 ⁷	4.40 ⁶ 4.90 ^{7,6} 5.55 ^{4,4}						5.10 ^{2,3}	4.70 ^{1,2}
Long tee (10 gage)	4.80 ⁹⁻¹⁵		4.80 ¹			4.80 ⁷	5.30 ^{6,4}							
Hi Str. low alloy, h.r.	5.05 ^{1-5,9}	5.05 ¹	5.05 ^{1-8,9}	5.05 ⁴⁻⁵			5.05 ¹⁻⁴ 5.30 ⁶ 5.40 ^{1,3}		5.05 ³	5.05 ^{2,6}		5.05 ³		5.25 ^{1,2}
Hi str. low alloy, c.r.	6.20 ^{1-5,9}		6.20 ^{1-8,9}	6.20 ⁴⁻⁵			6.20 ^{1-1,3} 6.45 ⁶		6.20 ³			6.20 ³		6.40 ^{1,2}
Hi str. low alloy, galv.	6.75 ¹											6.75 ³		
STRIP Hot-rolled	3.25 ^{5,7,9} 3.50 ^{7,8-41}	3.25 ^{3-6,6}	3.25 ^{1-6,8}	3.25 ⁵			3.25 ¹⁻⁴⁻⁶ 3.73 ^{1,3}		3.25 ³	3.50 ^{2,6}		3.25 ³		3.45 ^{1,2} 4.05 ^{4,7}
Cold-rolled	4.15 ^{5,7,9} 4.85 ^{6,8}	4.30 ⁸ 4.50 ^{6,8}	4.30 ⁸	4.15 ²⁻⁵		4.15 ⁷	4.15 ⁴⁻⁶⁻⁸⁻⁹ 4.50 ^{4,6} 4.85 ^{1,3}		4.15 ³			4.15 ³		4.35 ^{1,2} 4.75 ^{4,8} 4.85 ^{4,7}
Hi str. low alloy, h.r.	4.95 ⁹		4.95 ^{1-8,9}	4.95 ⁵			4.95 ¹⁻⁴ 5.20 ⁶ 5.30 ^{1,3}		4.95 ³	4.95 ^{2,6}		4.95 ³		5.15 ^{1,2}
Hi Str. low alloy, c.r.	6.20 ⁹			6.20 ²⁻³			6.20 ⁴ 6.45 ⁶ 6.55 ^{1,3}		6.40 ³			6.40 ³		6.40 ^{1,2}
TINPLATE Cokes, 1.50-lb base box 1.25 lb, deduct 20¢	\$7.50 ¹⁻⁵ 9.15		\$7.50 ¹⁻⁶ 8				\$7.50 ⁴					\$7.60 ³	\$7.70 ^{2,3}	
Electrolytic 0.25, 0.50, 0.75 lb box	Deduct \$1.15, 90¢ and 65¢ respectively from 1.50-lb coke base box price													
BLACKPLATE, 29 gage Hollowware enameling	5.30 ^{1-5,15}		5.30 ¹⁻⁸				5.30 ⁴					5.40 ³	5.50 ^{2,3}	
BARS Carbon steel	3.45 ^{1-5,9}	3.45 ^{1-4,23}	3.45 ^{1-8,9}	3.45 ⁴	3.45 ⁴		3.45 ^{1-4,6}		3.45 ³⁻⁴		3.45 ³			3.55 ^{1,2}
Reinforcing†	3.45 ¹⁻⁵	3.45 ⁴	3.45 ^{1-8,9}	3.45 ⁴			3.45 ^{1-4,6}		3.45 ³⁻⁴		3.45 ³	3.45 ³		
Cold-finished	4.10 ⁵ 4.15 ^{3-4,17} 52.69.71	4.15 ^{2,23} 69.70	4.15 ^{4,7,9} 74	4.15 ²⁻⁶¹	4.15 ⁴⁻⁴² 62		4.15 ^{6-10,57}		4.15 ^{7,0}					4.35 ^{1,2} 4.30 ⁴
Alloy, hot-rolled	3.95 ¹⁻¹⁷	3.95 ^{1-4,23}	3.95 ^{1-8,9}		3.95 ⁴		3.95 ^{1-6,25}	3.95 ³	3.95 ³⁻⁴		3.95 ³			4.25 ^{1,2} 4.10 ^{3,1}
Alloy, cold-drawn	4.90 ²⁻¹⁷ 52.69.71	4.90 ^{2,23} 69.70	4.90 ^{4,7,9} 74	4.90 ²⁻⁶¹	4.90 ⁴⁻⁴² 62		4.90 ^{6-25,57}	4.90 ³	4.90 ³⁻⁷⁰					5.05 ⁴
Hi str. low alloy, h.r.	5.20 ¹⁻⁵		5.20 ^{1-8,9}	5.20 ⁴			5.20 ¹ 5.45 ⁶	5.20 ³	5.20 ³		5.20 ³			5.40 ^{1,2}
PLATE Carbon steel	3.50 ¹⁻⁶	3.50 ¹	3.50 ^{1-8,9}	3.50 ⁴			3.50 ¹ 3.75 ^{1,3}		3.50 ³	3.75 ^{2,6}	3.50 ³	3.50 ³	4.20 ^{2,3}	3.75 ^{1,2}
Floor plates	4.55 ¹	4.55	4.55 ²	4.55 ²						4.55 ^{2,6}				
Alloy	4.40 ¹	4.40 ¹	4.40 ¹				4.75 ^{1,3}			4.55 ^{2,6}	4.40	4.40 ³		
Hi Str. low alloy	5.35 ¹⁻⁵	5.35 ¹	5.35 ¹⁻⁸	5.35 ⁴⁻⁵			5.60 ⁶ 5.70 ^{1,3}			5.35 ^{2,6}	5.35 ³	5.35 ³		5.60 ^{1,2}
SHAPES, Structural	3.40 ^{1-8,9}	3.40 ^{1-2,3}	3.40 ^{1-8,9}					3.45 ³	3.45 ³		3.45 ³			
Hi str. low alloy	5.15 ¹⁻⁵	5.15 ¹	5.15 ^{1-8,9}				5.40 ⁶	5.20 ³	5.20 ³		5.20 ³			
MANUFACTURERS' WIRE Bright	4.50 ²⁻⁵ 4.75 ^{1,8}	4.50 ^{2-4,12} 33.34		4.50 ²⁻⁷⁷			4.50 ⁶	Kokomo = 4.60 ^{3,0}			4.50 ³	4.60 ³	Duluth = 4.50 ³ Pueblo = 4.75 ^{1,4}	
PILING, Steel Sheet	4.20 ¹⁻⁹	4.20 ¹							4.20 ³					

Smaller numbers indicate producing companies. See key at right.
Prices are in cents per lb unless otherwise noted. Extras apply.

IRON AGE

STEEL PRICES

KEY TO STEEL PRODUCERS

With Principal Offices

- 1 Carnegie-Illinois Steel Corp., Pittsburgh
- 2 American Steel & Wire Co., Cleveland
- 3 Bethlehem Steel Co., Bethlehem
- 4 Republic Steel Corp., Cleveland
- 5 Jones & Laughlin Steel Corp., Pittsburgh
- 6 Youngstown Sheet & Tube Co., Youngstown
- 7 Armco Steel Corp., Middletown, Ohio
- 8 Inland Steel Co., Chicago
- 9 Weirton Steel Co., Weirton, W. Va.
- 10 National Tube Co., Pittsburgh
- 11 Tennessee Coal, Iron & R. R. Co., Birmingham
- 12 Great Lakes Steel Corp., Detroit
- 13 Sharon Steel Corp., Sharon, Pa.
- 14 Colorado Fuel & Iron Corp., Denver
- 15 Wheeling Steel Corp., Wheeling, W. Va.
- 16 Geneva Steel Co., Salt Lake City
- 17 Crucible Steel Co. of America, New York
- 18 Pittsburgh Steel Co., Pittsburgh
- 19 Kaiser Steel Corp., Oakland, Calif.
- 20 Portsmouth Div., Detroit Steel Corp., Detroit
- 21 Lukens Steel Co., Coatesville, Pa.
- 22 Granite City Steel Co., Granite City, Ill.
- 23 Wisconsin Steel Co., South Chicago, Ill.
- 24 Columbia Steel Co., San Francisco
- 25 Copperweld Steel Co., Glassport, Pa.
- 26 Alan Wood Steel Co., Conshohocken, Pa.
- 27 Calif. Cold Rolled Steel Corp., Los Angeles
- 28 Allegheny Ludlum Steel Corp., Pittsburgh
- 29 Worth Steel Co., Claymont, Del.
- 30 Continental Steel Corp., Kokomo, Ind.
- 31 Rotary Electric Steel Co., Detroit
- 32 Laclede Steel Co., St. Louis
- 33 Northwestern Steel & Wire Co., Sterling, Ill.
- 34 Keystone Steel & Wire Co., Peoria, Ill.
- 35 Central Iron & Steel Co., Harrisburg, Pa.
- 36 Carpenter Steel Co., Reading, Pa.
- 37 Eastern Stainless Steel Corp., Baltimore
- 38 Washington Steel Corp., Washington, Pa.
- 39 Jessop Steel Co., Washington, Pa.
- 40 Blair Strip Steel Co., New Castle, Pa.
- 41 Superior Steel Corp., Carnegie, Pa.
- 42 Timken Steel & Tube Div., Canton, Ohio*
- 43 Babcock & Wilcox Tube Co., Beaver Falls, Pa.
- 44 Reeves Steel & Mfg. Co., Dover, Ohio
- 45 John A. Roebling's Sons Co., Trenton, N. J.
- 46 Simonds Saw & Steel Co., Fitchburg, Mass.
- 47 McLouth Steel Corp., Detroit
- 48 Cold Metal Products Co., Youngstown
- 49 Thomas Steel Co., Warren, Ohio
- 50 Wilson Steel & Wire Co., Chicago
- 51 Sweet's Steel Co., Williamsport, Pa.
- 52 Superior Drawn Steel Co., Monaca, Pa.
- 53 Tremont Nail Co., Wareham, Mass.
- 54 Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
- 55 Ingersoll Steel Div., Chicago
- 56 Phoenix Iron & Steel Co., Phoenixville, Pa.
- 57 Fitzsimmons Steel Co., Youngstown
- 58 Stanley Works, New Britain, Conn.
- 59 Universal-Cyclops Steel Corp., Bridgeville, Pa.
- 60 American Cladmetals Co., Carnegie, Pa.
- 61 Cuyahoga Steel & Wire Co., Cleveland
- 62 Bethlehem Pacific Coast Steel Corp., San Francisco
- 63 Follansbee Steel Corp., Pittsburgh
- 64 Niles Rolling Mill Co., Niles, Ohio
- 65 Atlantic Steel Co., Atlanta
- 66 Acme Steel Co., Chicago
- 67 Joslyn Mfg. & Supply Co., Chicago
- 68 Detroit Steel Corp., Detroit
- 69 Wyckoff Steel Co., Pittsburgh
- 70 Bliss & Laughlin, Inc., Harvey, Ill.
- 71 Columbia Steel & Shaffing Co., Pittsburgh
- 72 Cumberland Steel Co., Cumberland, Md.
- 73 La Salle Steel Co., Chicago
- 74 Monarch Steel Co., Inc., Hammond, Ind.
- 75 Empire Steel Co., Mansfield, Ohio
- 76 Mahoning Valley Steel Co., Niles, Ohio
- 77 Oliver Iron & Steel Co., Pittsburgh
- 78 Pittsburgh Screw & Bolt Co., Pittsburgh
- 79 Standard Forging Corp., Chicago
- 80 Driver Harris Co., Harrison, N. J.
- 81 Detroit Tube & Steel Div., Detroit
- 82 Reliance Div., Eaton Mfg. Co., Massillon, Ohio
- 83 Sheffield Steel Corp., Kansas City
- 84 Plymouth Steel Co., Detroit

*Add 10 pct to quoted prices

Kansas City	Houston	Birmingham	WEST COAST Seattle, San Francisco, Los Angeles, Fontana	
			F=\$76.00	INGOTS Carbon forging, net ton
	\$59.00 ²³		F=\$77.00	Alloy, net ton
		\$53.00 ¹¹	F=\$72.00 ¹⁹	BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton
	\$71.00 ²³	\$63.00 ¹¹	F=\$82.00 ¹⁹	Carbon forging billets, net ton
	\$74.00 ²³		F=\$85.00 ¹⁹	Alloy net ton
				PIPE SKELP
	4.25 ²³	3.85 ¹¹	SF=4.50 ²⁴ LA=4.65 ^{24, 62}	WIRE RODS
		3.35 ¹¹	SF, LA=4.05 ²⁴ F=4.25 ¹⁹	SHEETS Hot-rolled (18 ga. & hvr.)
		4.10 ¹¹	SF=5.05 ²⁴ F=5.00 ¹⁹	Cold-rolled
		4.40 ¹¹	SF, LA=5.15 ²⁴	Galvanized (10 gage)
			Ashland=4.40 ⁷ Kokomo=4.50 ²⁰	Enameling (12 gage)
				Long ternes (10 gage)
		5.05 ¹¹	F=6.00 ¹⁹	Hi str. low alloy, h.r.
			F=7.05 ¹⁹	Hi str. low alloy, c.r.
				Hi str. low alloy, galv.
3.85 ²³	3.65 ²³	3.25 ¹¹	SF, LA=4.00 ^{24, 62} F=4.40 ¹⁹ , S=4.25 ⁶²	STRIP Hot-rolled
			Ashland=3.25 ⁷ Atlanta=3.40 ⁶⁵	Cold-rolled
			F=5.75 ¹⁹ LA=5.85 ²⁷	Hi str. low alloy, h.r.
		4.95 ¹¹	F=5.90 ¹⁹	Hi str. low alloy, c.r.
			F=6.95 ¹⁹	
		7.60 ¹¹	SF=8.25 ²⁴	TINPLATE Cokes, 1.50-lb base box 1.25 lb, deduct 20¢
Deduct \$1.15, 90¢ and 85¢ respectively from 1.50-lb coke base box price				Electrolytic 0.25, 0.50, 0.75 lb box
				BLACKPLATE, 29 gage Hollowware enameling
4.05 ²³	3.85 ²³	3.45 ¹¹	SF, LA=4.15 ²⁴ LA=4.15 ²⁴	BARS Carbon steel
4.05 ²³	3.85 ²³	3.45 ¹¹	SF, S=4.20 ⁶² F=4.10 ¹⁹	Reinforcing†
			Atlanta=3.60 ⁶⁵	Cold-finished
			Putnam, Newark=4.55 ⁶⁹	Alloy, hot-rolled
4.55 ²³	4.35 ²³		LA=5.00 ⁶² F=4.95 ¹⁹	Alloy-, cold-drawn
			Newark, ⁶⁹ Worcester ² =5.20 Hartford=5.20 ⁴	Hi str. low alloy, h.r.
		5.20 ¹¹	F=6.25 ¹⁹	PLATE Carbon steel
	3.90 ²³	3.50 ¹¹	F=4.10 ¹⁹ S=4.40 ⁶² Geneva=3.50 ¹⁶	Floor plates
			Claymont=3.90 ²⁰ Coatesville=3.90 ²¹ Harrisburg=4.25 ³⁵	Alloy
			Harrisburg=5.25 ³⁵	Hi str. low alloy
			F=5.40 ¹⁹	
		5.35 ¹¹	F=5.95 ¹⁹	SHAPES, Structural
4.00 ²³	3.80 ²³	3.40 ¹¹	SF=3.95 ⁶² LA=4.00 ^{24, 62}	Hi str. low alloy
		5.15 ¹¹	F=4.00 ¹⁹ S=4.05 ⁶²	
5.10 ²³	4.90 ²³	4.50 ¹¹	SF, LA=5.45 ^{24, 62}	MANUFACTURERS' WIRE Bright
			Portsmouth=4.50 ²⁰ Worcester=4.60 ²	

Notes: †Special coated mfg ternes deduct \$1.15 from 1.50-lb coke base box price.
Can-making quality blackplate, 55 to 128-lb, deduct \$1.90 from 1.50-lb coke base box.
†Straight lengths only from producer to fabricator.

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb. (Metropolitan area delivery, add 20¢ to base price except Birmingham, San Francisco, Cincinnati, New Orleans, St. Paul (*), add 15¢; Philadelphia, add 25¢, Chicago, add 30¢).

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (16 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140 Ann.
Baltimore	5.15	6.30 ¹	6.55 ²	5.50	6.55 ¹¹	5.40-6.04 ¹¹	5.60	5.50	6.10	9.00	9.00	11.12	11.49
Birmingham	5.15 ¹⁰	5.95	6.15 ⁷	5.10	6.10	5.40	5.25	5.10	6.00	9.00	9.00	11.12	11.49
Boston	5.75	6.55 ²⁰	6.94 ⁸	5.70	6.90-6.95	6.08	5.75	5.80	6.10-6.60	9.70-9.97	9.00-10.00	11.15	11.43
Buffalo	5.15	5.95	6.94	5.41	7.27	5.85	5.35	5.15	5.75	9.00	9.00	11.05	11.33
Chicago*	5.15	6.20	6.95	5.10	6.30	5.40	5.25	5.10	5.65	9.25	9.05	10.70	11.00
Cincinnati*	5.42-5.97	5.90-6.24	6.39	5.35	6.35	5.79	5.64	5.35-5.54	5.90-6.25	9.00-9.81	9.00-10.11	11.05-11.20	11.35-11.60
Cleveland	5.15	5.95	7.00-7.10	5.24	6.38	5.52	5.37	5.12	5.75	9.30	9.00	10.81	11.11
Detroit	5.33	6.08-6.33	7.09	5.40	6.43-6.80	5.58-5.79	5.64-5.68	5.30	5.91	9.50	9.00	11.01	11.31
Houston	6.00	6.33	7.10	6.10	6.80	6.00	5.95	6.10	7.60	10.35-10.45	10.50-10.60	11.50	11.93-12.10
Indianapolis	5.15	6.20	6.95	5.10	6.30	5.40	5.25	5.10	5.65	9.25	9.05	10.70	11.00
Kansas City	5.75	6.55 ²⁰	7.55	5.70	6.95	6.00	5.85	5.70	6.35	9.00	10.15	11.30	11.60
Los Angeles	5.90	7.45	7.70 ³	5.95	6.70 ¹⁰	6.00	5.90	5.90	7.55	10.75	10.75	12.45	12.75
Memphis	5.93	6.68	7.55	5.90	6.80-6.81	6.08	5.93	5.68	6.51	9.00	9.00	11.05	11.35
Milwaukee	5.29	6.09	6.94-6.99	5.24	6.32	5.54	5.39	5.24	5.89	9.39	9.09	10.84	11.14
New Orleans*	5.60 ¹	6.75	7.54 ²	5.50 ¹	6.80	5.85	5.55 ¹	5.55 ¹	6.75	9.00	9.00	11.05	11.35
New York	5.82	6.64	7.54 ²	5.84	6.78	5.80	5.68	5.67	6.44	9.00	9.00	11.05	11.35
Norfolk	6.10 ¹³	7.00	7.54 ²	6.30 ¹³	6.80	6.15 ¹³	6.20 ¹³	6.15 ¹³	7.20 ¹³	9.00	9.00	11.05	11.35
Philadelphia	6.05	6.20-6.35	6.85 ¹	5.65	6.29	5.65	5.45	5.60	6.21	9.35	9.05	10.90	11.10
Pittsburgh	5.15	5.95	6.60	5.20	5.95-6.00	5.35	5.25	5.10	5.75	9.25	9.05	10.70	11.00
Portland	6.60-7.10 ¹	8.40 ³	7.54 ²	6.65 ⁹	6.80	6.40 ⁹	6.50	6.45-6.45 ⁹	8.60 ¹⁴	12.00 ¹⁸	11.60 ¹⁸	13.60 ²⁰	13.90 ²⁰
Salt Lake City	5.85	6.70	7.54 ²	7.45	6.75	6.10 ³	5.90	7.35 ²	8.75	9.00	9.00	11.05	11.35
San Francisco*	6.20	7.60 ³	7.75 ³	6.15	7.65 ¹⁰	6.10	6.00	6.00	7.55	10.75	10.75	12.45	12.75
Seattle	6.60 ⁴	8.15 ²	8.40 ²	6.65 ⁴	6.80	6.35 ⁴	6.20 ⁴	6.35 ⁴	8.50 ¹⁴	9.00	9.00	11.05	11.35
St. Louis	5.48	6.28	7.18	5.43	7.30	5.73	5.50	5.43	6.08	9.58	9.08	11.03	11.33
St. Paul*	5.71	6.51	7.41	5.60	6.18-6.82	5.98	5.81	5.66	6.31	9.81	10.11	11.26	11.56

BASE QUANTITIES (Standard unless otherwise keyed on prices.)

Hot-rolled sheets and strip, hot rolled bars and bar shapes, structural shapes, plate, galvanized sheets and cold-rolled sheets: 2000 lb. Cold-finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb.

All HR products may be combined to determine quantity bracket. All galvanized sheets may be combined to determine quantity bracket. CR sheets may not be combined with each other or with galv. sheets to determine quantity bracket.

Exceptions:

(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 499 lb; (4) 300 to 999 lb; (5) 2000 to 5999 lb; (6) 1000 lb and over; (7) 500 to 1499 lb; (8) 400 lb and over; (9) 400 to 999 lb; (10) 500 to 999 lb; (11) 400 to 399 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 999 lb; (16) 6000 lb and over; (17) up to 1999 lb; (18) 1000 to 4999 lb; (19) 1500 to 3499 lb; (20) CR sheets may be combined for quantity; (21) 3 to 24 bundles.

PIG IRON PRICES

Dollars per gross ton. Delivered prices do not include 3 pct tax on freight.

PRODUCING POINT PRICES						DELIVERED PRICES (BASE GRADES)							
Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Producing Point	Rail Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	48.00	48.50	49.00	49.50	.....	Boston	Everett	\$60.00	52.85-53.05	53.55-53.75	.....	.....	60.90
Birmingham	45.38	45.88	.....	.....	.....	Boston	Steelton	6.90	.....	52.79	53.29	53.79	.....
Buffalo	49.00	49.50	50.00	.....	.....	Brooklyn	Bethlehem	4.29	.....	52.58	.....	.....	.....
Chicago	49.00	49.50	49.50	50.00	54.00	Cincinnati	Birmingham	6.70	52.08	.....	.....	.....	.....
Cleveland	49.00	49.50	49.50	50.00	.....	Jersey City	Bethlehem	2.63	.....	51.13	51.63	52.13	.....
Dalingerfield, Tex.	45.00	45.50	45.50	.....	.....	Los Angeles	Geneva-Ironton-Fontana	7.70	53.70	54.20	.....	.....	.....
Duluth	49.00	49.50	49.50	50.00	.....	Manassas	Cleveland-Toledo	3.33	49.33	49.83	50.33	50.83	54.33
Erie	49.00	49.50	49.50	50.00	.....	Philadelphia	Bethlehem	2.39	50.39	50.89	51.39	51.89	.....
Everett	.....	52.25	52.75	.....	.....	Philadelphia	Swedeland	1.44	51.44	51.94	52.44	52.94	.....
Fontana	52.00	52.50	.....	.....	.....	Philadelphia	Steelton	3.09	51.09	51.59	52.09	52.59	57.09
Granite City	50.90	51.40	51.90	.....	.....	Rochester	Buffalo	2.63	51.63	52.13	52.63	.....	.....
Ironton, Utah	48.00	48.50	.....	47.00	.....	San Francisco	Geneva-Ironton-Fontana	7.70	53.70	54.20	.....	.....	.....
Pittsburgh	46.00*	.....	.....	50.00	.....	Seattle	Geneva-Ironton-Fontana	7.70	53.70	54.20	.....	.....	.....
Neville Island	49.00	49.50	49.50	50.00	.....	St. Louis	Granite City	0.75 Arb.	48.65	49.15	49.65	.....	.....
Geneva, Utah	46.00	46.50	.....	.....	.....	Syracuse	Buffalo	3.58	52.58	53.08	53.58	.....	.....
Sharpsville	49.00	49.50	49.50	50.00	.....							
Steelton	48.00	48.50	49.00	49.50	54.00								
Swedeland	50.00	50.50	51.00	51.50	.....							
Toledo	49.00	49.50	49.50	50.00	.....							
Troy, N. Y.	51.00	51.50	52.00	.....	57.00								
Youngstown	49.00	49.50	49.50	50.00	.....							

* Monesson, \$51.00.
Producing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢

per ton for each 0.50 pct manganese content in excess of 1.00 pct. \$2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and \$1 per ton extra for each additional 0.25 pct nickel.
Silvery iron (blast furnace) silicon 0.01 to 0.50 pct C/L per g.t., f.o.b. Jackson, Ohio—\$57.00; f.o.b. Buffalo, \$58.25. Add \$1.00** per ton for each additional 0.50 pct \$1 up to 17 pct.

Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add \$1.00 per ton for 0.75 pct or more P. Bessemer ferro-silicon prices are \$1.00 per ton above silvery iron prices of comparable analysis. **Buffalo, add \$1.50.
Charcoal pig iron base price for low phosphorus \$62.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, \$70.50. High phosphorus charcoal pig iron is not being produced.



ONE OF THE BIG 3 STANDARDIZATIONS — Weldit TORCHES

Weldit Torches have been accepted as standard by one of the divisions of the Big 3 automobile manufacturing group. Such recognition hallmarks Weldit Torches as tops in quality and performance. Shown above is the initial shipment of rugged Weldimatic No. C-47 Lightweight Blow Pipes and No. W-46-F Heavy Duty Weldimatic Welding Torches.

Write today for technical information that will save you money in your welding operations.

Weldit
INC.
SINCE 1918

992 OAKMAN BLVD. DETROIT 6, MICH.

IRON AGE MARKETS & PRICES FOUNDED 1855

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts, f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)
Base discount

Machine and Carriage Bolts

	Pct Off	List
	Less	Case C.
1/2 in. & smaller x 6 in. & shorter	27	38
9/16 & 5/8 in. x 6 in. & shorter...	29	40
3/4 in. & larger x 6 in. & shorter...	26	37
All diam. longer than 6 in.	22	34
Lag, all diam. longer than 6 in.	28	39
Lag, all diam x 6 in. & shorter...	30	41
Flow bolts	40	—

Nuts, Cold Punched or Hot Pressed (Hexagons or Square)

1/2 in. and smaller	25	37
9/16 to 5/8 in.	23	35
3/4 to 1 1/2 in. inclusive	23	35
1 1/2 in. and larger	16	29

Semifinished Hexagon Nuts

(Less case lots)

	Pct Off List		
	Reg	Hvy	Lt
1/2 in. and smaller.....	41	35	41
9/16 to 5/8 in.	36	30	36
3/4 to 1 1/2 in.	31	27	33
1 1/2 in. and larger.....	21	17	..

In full case lots, 15 pct additional discount.

In full case lots, 15 pct additional discount.

Stove Bolts

	Pct Off	List
Packaged, steel, plain finish...	63	
Packaged, plated finish	50	
Bulk, plain finish**	69*	

* Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

** Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Large Rivets

(1/2 in. and larger)

Base per 100 lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham, Lebanon, Pa. \$7.25

Small Rivets

(7/16 in. and smaller)

	Pct Off	List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	43	

Cap and Set Screws

	Pct Off	List
(In bulk)		
Hexagon head cap screws, coarse or fine thread, 1/4 in. thru 5/8 in. x 6 in., SAE 1020, bright	60	
1/4 in. through 5/8 in. x 6 in. and shorter high C heat treated	54	
Milled studs	23	
Flat head cap screws, listed sizes...	24	
Fillister head cap, listed sizes	43	
Set screws, sq head, cup point, 1 in. diam and smaller x 6 in. and shorter	59	

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon	4.50¢
0.41 to 0.60 carbon	5.95¢
0.61 to 0.80 carbon	6.55¢
0.81 to 1.05 carbon	8.50¢
1.06 to 1.35 carbon	10.80¢

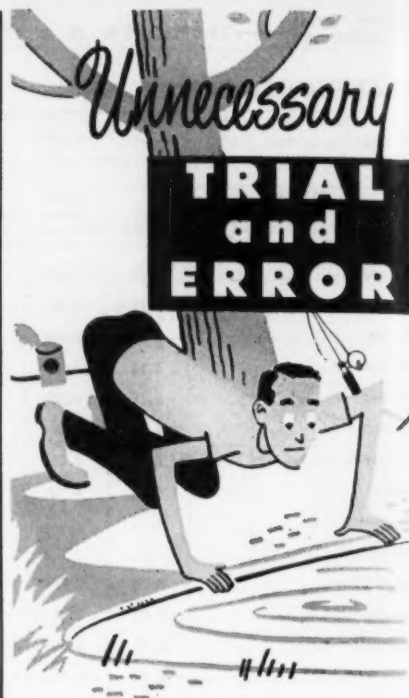
Worcester, add 0.30¢; Sharon, add 0.35¢.

LAKE SUPERIOR ORES

(51.50% Fe; natural content, delivered lower lake ports)

	Per gross ton
Old range, bessemer	\$8.10
Old range, nonbessemer	7.95
Mesabi, bessemer	7.85
Mesabi, nonbessemer	7.70
High phosphorus	7.70

After Jan. 25, 1950, increases or decreases in Upper Lake rail freight, dock handling charges and taxes are for buyers' account.



WHEN you're fishing, it's only by trial and error that you find what shadow that 3-pounder is hiding under.

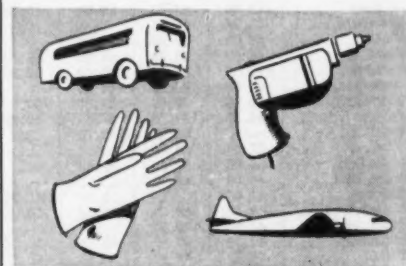
Trial and error isn't necessary when you specify Well-Cast aluminum and magnesium castings.

You will be buying 40 years' experience ... 3 complete plants ... X-Ray inspection equipment ... highly trained men in sand, semi-permanent and permanent mold ... close metallurgical control in all production stages.

You won't make an error trying us.

Like to receive the Wellman Magazine each month? Just drop us a note.

"A Light Casting is the Right Casting"



Well-Made wood and metal patterns
Well-Cast Ampco bronze castings

THE WELLMAN
Bronze & Aluminum Co.

2511 EAST 93rd STREET
CLEVELAND 4, OHIO

Can you clean steel and condition it for painting for less than 20 cents per 1,000 square feet?

This FREE Folder Tells How To Do It

WITH minimum equipment ... in minimum time ... at minimum cost ... the OAKITE CryCoat PROCESS* cleans metal surfaces and prepares them for painting ... prevents corrosion before and after the metal is painted.

*Reg. U. S. Pat. Off.

FREE Write to Oakite Products, Inc., 30H Thames St., New York 6, N. Y., for Folder F7642. This 8-page illustrated leaflet describes 19 advantages of the OAKITE CryCoat PROCESS and lists 10 ways in which it cuts the cost of cleaning and preparing for painting.

Invitation When you attend the big METAL SHOW in Chicago, October 23 to 27, be sure to see the Oakite exhibit in Booth 322.

Drop in; ask about the OAKITE CryCoat PROCESS; and get your copy of the 44-page illustrated booklet "Some good things to know about Metal Cleaning."

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

Technical Service Representatives Located in Principal Cities of United States and Canada

IRON AGE MARKETS & PRICES

ELECTRODES

Cents per lb, f.o.b. plant, threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb
GRAPHITE		
17, 18, 20	60, 72	17.00¢
8 to 16	48, 60, 72	17.00¢
7	48, 60	18.64¢
6	48, 60	19.95¢
4, 5	40	20.48¢
3	40	21.53¢
2 1/2	24, 30	22.05¢
2	24, 30	24.15¢
CARBON		
40	100, 110	7.65¢
35	65, 110	7.65¢
30	65, 84, 110	7.65¢
24	72 to 104	7.65¢
20	84, 90	7.65¢
17	60, 72	7.65¢
14	60, 72	8.16¢
10, 12	60	8.42¢
8	60	8.67¢

CLAD STEEL

Base prices, cents per pound, f.o.b. mill

Stainless-carbon	Plate	Sheet
No. 304, 20 pct.		
Coatesville, Pa. (21)...	*28.00	
Washgtn, Pa. (39)...	*28.00	
Claymont, Del. (29)...	*28.00	
Conshohocken, Pa. (26)		*24.00
New Castle, Ind. (55)...	*26.50	*25.50
Nickel-carbon		
10 pct, Coatesville (21)...	31.00	
Inconel-carbon		
10 pct, Coatesville (21)...	39.00	
Monel-carbon		
10 pct, Coatesville (21)...	32.00	
No. 302 Stainless-copper-stainless, Carnegie, Pa. (60)		75.00
Aluminized steel sheets, hot dip, Butler, Pa. (7)...		7.75

* Includes annealing and pickling, or sandblasting.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	\$1.00
18	4	1	—	5	\$1.565
18	4	2	—	—	\$1.13
1.5	4	1.5	8	—	71.5¢
6	4	2	6	—	76.5¢
High-carbon-chromium					57.5¢
Oil hardened manganese					32¢
Special carbon					29.5¢
Extra carbon					24.5¢
Regular carbon					21¢

Warehouse prices on and east of Mississippi are 3¢ per lb higher. West of Mississippi, 5¢ higher.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	\$14.00 to \$14.50
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	\$16.50 to \$17.00
Foundry, oven coke	
Buffalo, del'd	\$25.35
Chicago, f.o.b.	21.00
Detroit, f.o.b.	21.65
New England, del'd	23.40
Seaboard, N. J., f.o.b.	22.00
Philadelphia, f.o.b.	22.10
Swedeland, Pa., f.o.b.	21.20
Painesville, Ohio, f.o.b.	23.25
Erie, del'd	\$22.29 to 22.50
Cleveland, del'd	22.62
Cincinnati, del'd	22.71
St. Paul, f.o.b.	21.00
St. Louis, del'd	22.18
Birmingham, del'd	20.79

FLUORSPAR

Washed gravel fluorspar, f.o.b. cars, Rosiclare, Ill. Base price, per ton net; Effective CaF₂ content:

70% or more	\$41.00
60% or less	38.00

Prices Continued on Page 268

don't scrap metal by turning!



...save by Swaging

on

TORRINGTON SWAGERS

The Torrington Rotary Swaging Machine uses every bit of stock. With 4000 hammer blows a minute, swaging reduces, sizes, rounds, tapers and points rod, wire and tubing. It makes metal tougher and more resilient. It hammers away minor surface defects.

Torrington Swagers are built to a mechanical perfection based on our 42 years' swaging experience. Send today for your free copy of the illustrated booklet describing the machine and the method.

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Firm _____
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An
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EF
CAR TYPE
Furnace



may be just the answer
to your requirement

Reflecting the advantages of our experienced engineering and correct design EF Car Type furnaces come up to temperature quickly—are easy to load and unload—and assure uniform heat treatment of the entire charge. These furnaces are highly efficient for annealing castings, bars, plates, etc.—stress relieving weldments—and a wide variety of other heat treating operations.

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Gas-Fired, Oil-Fired **EF** and Electric Furnaces
for any Process, Product or Production
THE ELECTRIC FURNACE CO.
WILSON ST. at PENNA. R. R. Salem - Ohio

NEW HEAVY-DUTY CART



Here's just the cart you need for wheeling coal, scrap, chips, turnings, borings and similar heavy materials. All-steel, completely welded and reinforced. Made extra strong and rugged for heavy duty service. Dumps easily. Rests securely in any one of the three positions shown here. Available with roller bearings, if desired.

Write for Circular No. 50.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Sterling
WHEELBARROWS



Look for this Mark of
STERLING Quality

IRON AGE MARKETS & PRICES FOUNDED 1855

REFRACTORIES

Fire Clay Brick (F.o.b. works) Carloads, Per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa.
(except Salina, Pa., add \$5).....\$86.00
No. 1 Ohio 80.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 80.00
No. 2 Ohio 72.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$1.50)..... 14.00

Silica Brick
Mt. Union, Pa., Ensley, Ala.\$86.00
Childs, Pa. 90.00
Hays, Pa. 91.00
Chicago District 95.00
Western Utah and Calif.101.00
Super Duty, Hays, Pa., Athens, Tex., Chicago106.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.) 15.00
Silica cement, net ton, bulk, Hays, Pa. 17.00
Silica cement, net ton, bulk, Ensley, Ala. 16.00
Silica cement, net ton, bulk, Chicago District 16.00
Silica cement, net ton, bulk, Utah and Calif. 22.50

Chrome Brick Per Net Ton
Standard chemically bonded, Balt., Chester\$72.00

Magnesite Brick
Standard, Baltimore\$94.00
Chemically bonded, Baltimore 83.00

Grain Magnesite St. %-in. grains
Domestic, f.o.b. Baltimore, in bulk fines removed, \$56.00 to \$57.00
Domestic, f.o.b. Chewelah, Wash., in bulk 33.00
in sacks 38.00

Dead Burned Dolomite
F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk Midwest, add 10¢; Missouri Valley, add 20¢....\$13.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.
Swedish sponge iron c.l.f. New York, ocean bags... 7.4¢ to 9.0¢
Canadian sponge iron, del'd, in East 10.00¢
Domestic sponge iron, 98+ % Fe, carload lots 9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+ % Fe 36.0¢ to 39.5¢
Electrolytic iron unannealed, minus 325 mesh, 99+ % Fe 48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+ % Fe... 63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.3+ % Fe. 70.0¢ to \$1.35
Aluminum 29.00¢
Brass, 10 ton lots 30.00¢ to 32.25¢
Copper, electrolytic, 10.25¢ plus metal value
Copper, reduced 10.00¢ plus metal value
Cadmium 100-199 lb. .95¢ plus metal value
Chromium, electrolytic, 99% min., and quantity \$3.50
Lead 6.5¢ plus metal value
Manganese 52.00¢
Molybdenum, 99% \$2.65
Nickel, unannealed 75.5¢
Nickel, annealed 51.5¢
Nickel, spherical, unannealed 78.5¢
Silicon 34.00¢
Solder powder, 6.5¢ to 8.5¢ plus met. value
Stainless steel, 302 75.00¢
Tin 11.00¢ plus metal value
Tungsten, 99% \$3.40
Zinc, 10 ton lots 20.50¢ to 23.85¢

CAST IRON WATER PIPE

Per net ton
6 to 24-in., del'd Chicago...\$95.30 to \$98.80
6 to 24-in., del'd N.Y. ... 94.50 to 95.50
6 to 24-in., Birmingham ... 81.50 to 86.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less \$108.50 to \$113.00
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.

IRON AGE MARKETS & PRICES

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si.)

0.06% C	28.75	0.20% C	27.75
0.10% C	28.25	0.50% C	27.50
0.15% C	28.00	1.00% C	27.25
2.00% C			27.00
65-69% Cr, 4-9% C			26.50
62-66% Cr, 4-6% C, 6-9% Si			21.35

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25

Low carbon type: 61-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

Chromium Metal

Contract prices, per lb chromium contained packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.

0.20% max. C	\$1.09
0.50% max. C	1.05
.00 min. C	1.04

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.)

Contract price, carloads, f.o.b. Niagara Falls, freight allowed; lump 4-in. x down, bulk 2-in. x down, 20.50¢ per lb of contained Cr plus 11.30¢ per lb of contained Si.

Bulk 1-in. x down, 20.65¢ per lb contained Cr plus 11.50¢ per lb contained Si.

Calcium-Cilicon

Contract price per lb of alloy, dump, delivered.

30-33% Ca, 60-65% Si, 3.00% max. Fe.

Carloads	17.90
Ton lots	21.00
Less ton lots	22.50

Calcium-Manganese-Silicon

Contract prices, cents per lb of alloy, lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	19.25
Ton lots	21.55
Less ton lots	22.55

CMSZ

Contract price, cents per pound of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.35% Zr, 3.50-5.00% C.

Ton lots	19.75
Less ton lots	21.00

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	15.75¢
Less ton lots	17.00¢

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 43 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	17.00¢
Ton lots to carload packed	18.00¢
Less ton lots	19.50¢

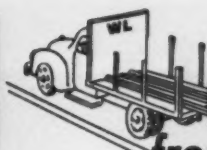
SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, 1/2 in. x 12 mesh.

Ton lots	17.25
Less ton lots	18.50

Prices Continued on Page 270

OVER ONE HUNDRED YEARS OF CONTINUOUS SERVICE. ROUNDS, SQUARES, FLATS, HEXAGONS, OCTAGONS.



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STANDARD ALLOY STEEL
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Although perhaps best known for our special HY-TEN Alloy Steels, Wheelock, Lovejoy carries a full line of standard steels in stock for fast, dependable service from our warehouses. These standard grades include: C-1117, A4615, E4617, A4620, A4140, A4142, A4145, A4150, A4340, etc.

There are many advantages in using a single source for all your alloy steel needs, and Wheelock, Lovejoy offers these extra services—modern heat treating, testing and cutting, plus prompt delivery of blocks, rings, spindles and other forged shapes to your exact specifications.

Call in your nearest Wheelock, Lovejoy metallurgical expert—he represents a firm that is backed by over a century of experience in the use and application of fine steels.

WL steels are metallurgically constant. This guarantees uniformity of chemistry, grain size, hardenability—thus eliminating costly changes in heat treating specifications.

Write today for your FREE COPY of the Wheelock, Lovejoy Data Book, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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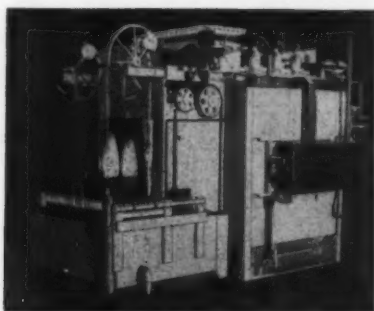
CASE HISTORY OF DOW HEAT TREATING PERFORMANCE ON SHIFTER SHAFTS AT TRACTOR PLANT

Heat Treatment: .005"-.008" effective case, carbonitrided 1500°F. Oil Quench, File Hard

Load: 640 Shifter Shafts, Fixture loaded, 1024 lbs. net — 1384 lbs. gross

Heating Time: 70 minutes Total Furnace Time: 2 hours 10 minutes

Net Production: 472 lbs. per hour



By processing these parts in the Dow Furnace, distortion is reduced sufficiently to permit elimination of the grinding operation after heat treating. Since no case is removed by grinding, the specified depth of case is reduced, effecting still further savings in heat treating costs. Reductions in direct labor, material handling, machining and cleaning costs, coupled with improved quality, contribute to savings which can amortize the original cost of your Dow Furnace in a few months.

DOW FURNACE OFFERS

- Gas cyaniding for $\frac{1}{2}$ to $\frac{1}{4}$ the cost of liquid cyaniding
- Uniformity of light case depths throughout load
- Unmatched versatility—gas cyaniding, gas carburizing, clean hardening or carbon restoration
- Improved quality. Forced, uniform quenching gives full hardness, reduced distortion.
- Maximum capacity with minimum investment and floor space

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FURNACE
COMPANY

IRON AGE MARKETS & PRICES

FERROALLOYS

Ferromanganese

78-82% Mn. maximum contract base price, gross ton, lump size.
F.o.b. Birmingham \$174
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont. \$172
F.o.b. Johnstown, Pa. \$174
F.o.b. Sheridan, Pa. \$172
F.o.b. Etina, Clairton, Pa. \$175
\$2.00 for each 1% above 82% Mn, penalty, \$2.15 for each 1% below 78%.
Briquets—Cents per pound of briquet, delivered, 66% contained Mn.
Carload, bulk 10.45
Ton lots 12.05

Spiegelisen

Contract prices gross ton, lump, f.o.b.
16-19% Mn 19-21% Mn
3% max. Si 3% max. Si
Palmerton, Pa. \$64.00 \$65.00
Pgh. or Chicago 65.00 66.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.
96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.
Carload, packed 29.75
Ton lots 31.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.
Carloads 25
Ton lots 30
Less ton lots 32

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb. of contained Mn 18.15¢

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, delivered.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	25.25	27.10	28.30
0.10% max. C	24.75	26.60	27.80
0.15% max. C	24.25	26.10	27.30
0.20% max. C	23.75	25.60	26.80
0.50% max. C	23.25	25.10	26.30
0.75% max. C, 7.00% max. Si	20.25	22.10	23.30

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.
Carload bulk 8.95
Ton lots 10.60
Briquet, contract basis carlots, bulk delivered, per lb of briquet 10.30
Ton lots 11.90

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$52.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$50.00. Add \$1.00 per ton for each additional 0.50% Si up to and including 18%. Add \$1.00 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.
96% Si, 2% Fe 20.70
97% Si, 1% Fe 21.10

Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 1 lb Si briquets.
Carload, bulk 6.30
Ton lots 7.90

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump, bulk, carloads, delivered.
25% Si 17.00 75% Si 13.50
50% Si 11.30 85% Si 14.65
90-95% Si 16.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	\$2.05	\$2.95	\$3.75
Less ton lots	2.40	3.30	4.65

IRON AGE MARKETS & PRICES

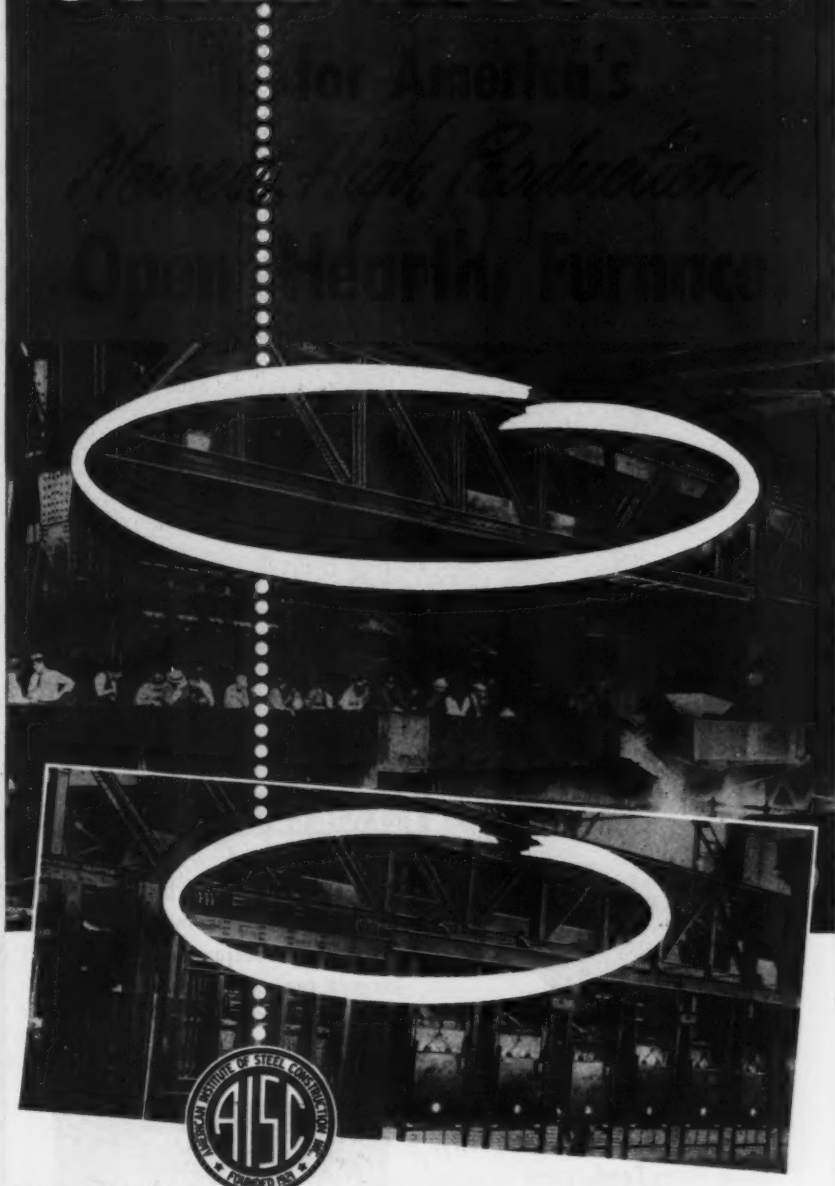
Other Ferrocilloys

Alsilfer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	7.65¢
Ton lots	9.05¢
Calcium molybdate, 45-40%, f.o.b. Langeloth, Pa., per pound contained Mo	96¢
Ferrocolumbium, 50-60%, 2 in. x D, contract basis, delivered, per pound contained Cb.	
Ton lots	\$3.50
Less ton lots	3.55
Ferro-Tantalum-columbium, 20% Ta, 40% Cb, 0.30 C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta	\$2.67
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo	\$1.13
Ferrophosphorus, electrolytic, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$3 unitage, per gross ton	\$65.00
10 tons to less carload	75.00
Ferrotitanium, 40%, regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	\$1.28
Ferrotitanium, 25%, low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	\$1.40
Less ton lots	\$1.45
Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton	\$167.00
Ferrotungsten, standard, lump or 1/4 x down, packed, per pound contained W, 5 ton lots, delivered	\$2.25
Ferrovandium, 35-55%, contract basis, delivered, per pound, contained V.	
Openhearth	\$2.90
Crucible	3.00
High speed steel (Primus)	3.10
Molybdc oxide, briquets or cans, per lb contained Mo, f.o.b. Langeloth, Pa.	95¢
bags, f.o.b. Washington, Pa., Langeloth, Pa.	94¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk, lump	11.00¢
Ton lots, bulk lump	11.50¢
Less ton lots, lump	12.25¢
Vanadium pentoxide, 88-92% V ₂ O ₅ contract basis, per pound contained V ₂ O ₅	\$1.20
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	21.00¢
Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.	
Carload, bulk	6.60¢

Boron Agents

Contract prices per lb of alloy, del.	
Borasil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	\$4.25
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed.	
Ton lots, per pound	10.00¢
Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lots	\$1.20
F.o.b. Wash., Pa.; 100 lb, up	
10 to 14% B.	.75
14 to 19% B.	1.20
19% min. B.	1.50
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.	
No. 1	93¢
No. 6	63¢
No. 79	45¢
Manganese-Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, delivered.	
Ton lots	\$1.46
Less ton lots	1.57
Nickel-Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.	
Less ton lots	\$1.80
Silicaz, contract basis, delivered.	
Ton lots	45.00¢

STEEL TRUSSES



Fort Pitt Bridge—fabricated the huge twin crane runway girders at the Weirton Steel Company Open Hearth Furnace—*largest in the steel industry!* Length of each girder, 106'11/2", height of each girder, 11'11", total weight of each girder, in place, 170 tons—or 340 tons of steel in *two runway girders*, that's a lot of steel, fabricated to exacting specifications. For your structural steel requirements call on **FORT PITT BRIDGE**.

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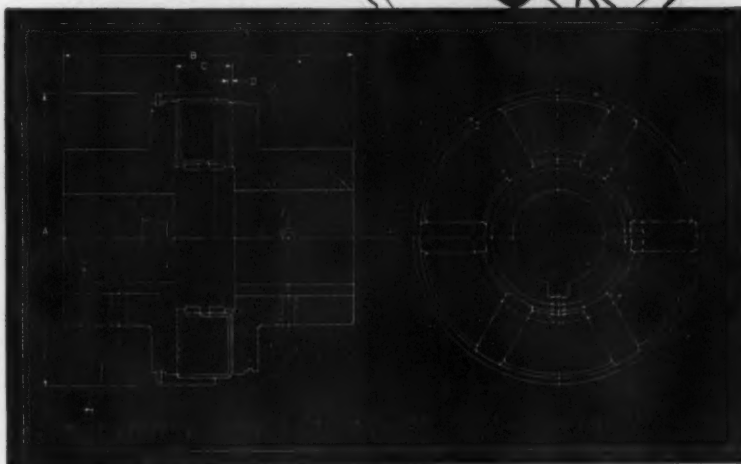
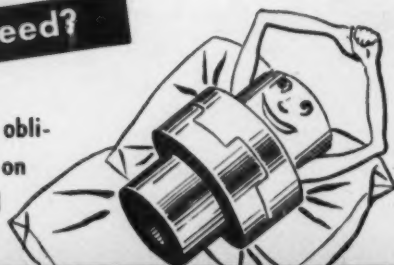
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Lovejoy L-R Type "H" for heavy duty. Electrical steel castings, and greater number of jaws provide far greater load capacity. Pat. & Pats. Pend.

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Simplified to the last degree! Ruggedly built of most enduring materials! Lovejoy Couplings give longest service with minimum attention. Every duty from 1/6 to 2500 h.p.

• NO LUBRICATIONS
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CHANGING CUSHIONS

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• News of Industry •

Knudson Aims 15,000 Cars Per Month in Railway Program

Washington—With the National Production Authority in reported agreement to allocate sufficient steel to push the freight car building program toward the 10,000 per month figure, Emergency Transportation Director James K. Knudson has set his sights on a rail car program of 12,000 to 15,000 per month.

NPA officials seem convinced the car building program need not wait completion of the general steel allocation program. With present production hovering about the 6000 figure, NPA need not allocate the entire estimated 200,000 tons of steel to bring the figure to 10,000.

If NPA agrees to allocate the needed steel, action will be taken with the Department of Justice to obtain clearance on agreements between NPA, car builders and railway men to head off a possible charge by some steel users that certain car building industries are monopolizing the construction program.

UK Team Studies U.S. Methods In Galvanizing Under ECA's Plan

Washington—A team of fifteen United Kingdom specialists is now studying American production processes to help increase production of galvanized metals in Great Britain.

For 6 weeks, the team will study all phases of galvanizing and the many manufacturing uses of galvanized metal while observing plant operations under the technical assistance program of the Economic Cooperation Administration.

On October 4 and 5 at the fall meeting of the American Hot Dip Galvanizers Assn. in White Sulphur Springs, W. Va., a member of the team, A. R. L. Chivers, metallurgist of the British Hot Dip Galvanizers Assn., presented a paper he had jointly prepared with R. L. Stubbs, director of the association on "European Trends in General Galvanizing."

FREE

PUBLICATIONS

Continued from Page 34

nate most machining, and their early availability. This new bulletin also describes the coordinated foundry and die shop facilities where Allite dies are produced. *Richard Brothers Div., Allied Products Corp.*

For free copy insert No. 8 on postcard, p. 35.

Firebrick

Engineers and company managers interested in the selection of refractory fire brick especially resistant to slag erosion, clinker action, and abrasion at high temperatures will find useful information presented in a new leaflet bulletin. Properties of Ironton Peerless fire brick, and typical applications are briefly outlined. Photographs of chemical, glass, and electric power plants using the brick are included. The bulletin also describes the use of Ironton's reliable airsetting bonding mortar, Alset. *The Ironton Fire Brick Co.*

For free copy insert No. 9 on postcard, p. 35.

Control Valves

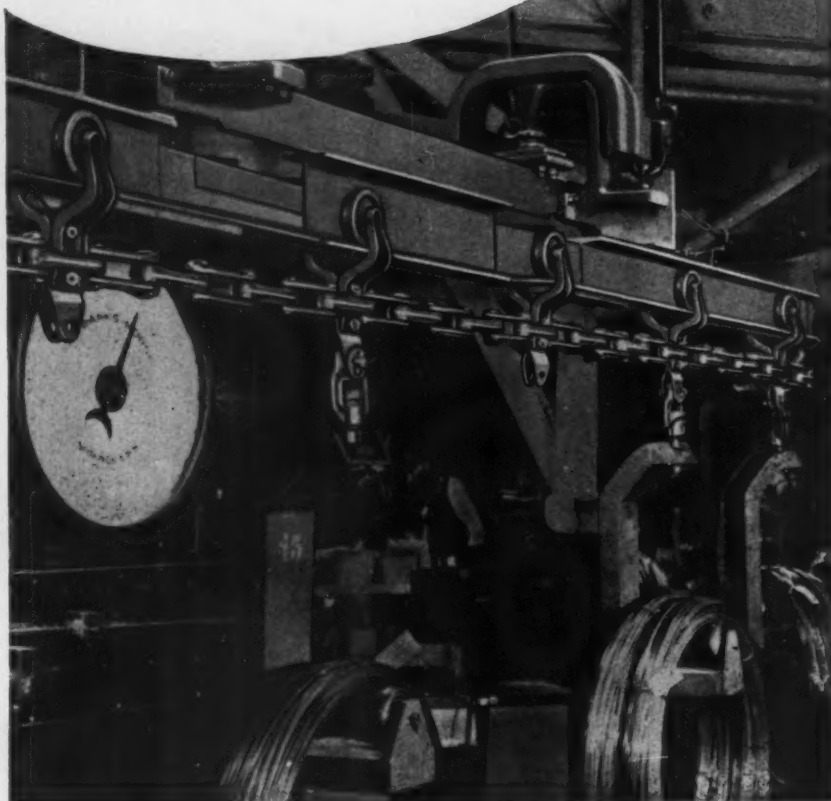
A new 4-p. bulletin describes the K & M Series 1200 and 1400 diaphragm control valves. The diaphragm motor embodies the accessibility and other desirable features of the "open yoke," formerly available only in cast iron construction, together with the strength and resistance to shock found only in steel. The boltless casing assembly is constructed with an exclusive clamping ring which permits ready inspection and re-assembly, as shown in the folder. *Kieley & Mueller Co.*

For free copy insert No. 10 on postcard, p. 35.

Bearing Balls

Useful information on deep hardened carbon steel bearing balls, burnishing materials and barrel finishing equipment is contained in a new 20-p. catalog-manual. The new booklet, designed to serve as a practical reference handbook for industrial users, contains authori-

THE SOLUTION OF A "WEIGHTY" PROBLEM



Here is another example showing how Webb cooperates with industry to lighten labor's load. Automatic weighing mechanism coupled with Webb conveyors eliminates costly hand trucking of heavy wire coils to scales—and to storage.

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PLUS MODERN CONVEYOR EQUIPMENT
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These three types of protective devices, all with one-piece plastic lenses or visors and each with many variations, give you a wide selection to meet specific requirements of work hazards. Their light weight and comfortable fit insure workers' willingness to wear them for long hours on the job. Complete information on plastic protection and other eye and respiratory safety equipment is available in the new WILLSON catalog. Get your copy from our nearest distributor or write direct to WILLSON PRODUCTS, INC., 231 Washington Street, Reading, Pa.



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FREE PUBLICATIONS

Continued

tative information on the use of such materials, in addition to a catalog of the manufacturer's products. Tables and charts giving sizes, tolerances, quantities and shipping weights are also included along with detailed information on Abbot methods of packaging. *Abbot Ball Co.*

For free copy insert No. 11 on postcard, p. 35.

Electrical Instruments

Production methods behind Simpson instruments are described and illustrated in a new 50-p. catalog showing the full bridge type movement with soft iron pole pieces that is responsible for the precision and dependability of these instruments. The complete line presented includes a full range of electrical instruments, as well as advanced designs in specialized television and FM equipment, and electrical and electronic devices to standard requirements. Complete specifications and prices are given. *Simpson Electric Co.*

For free copy insert No. 12 on postcard p. 35.

For Motor Control

How the Slipsyn starter gets the motor started right and provides complete protection is told in a new 8-p. bulletin. By accurately measuring the rotor slip and by applying the field excitation at the most favorable rotor position, the device takes advantage of the maximum synchronizing torque the motor is capable of producing, as shown in the booklet. *Westinghouse Electric Corp.*

For free copy insert No. 13 on postcard, p. 35.

Welding Electrodes

An informative new 4-p. bulletin describes pure tungsten electrodes for atomic hydrogen, helium and argon arc welding. The bulletin describes sizes, finishes and recommended electrodes for a-c and d-c inert gas electric arc and atomic hydrogen welding. Functions of the tungsten electrode, a brief description of electric arc welding and practical hints on procedure for obtaining maximum electrode life are included. *Tungsten & Chemical Div., Sylvania Electric Co.*

For free copy insert No. 14 on postcard, p. 35.

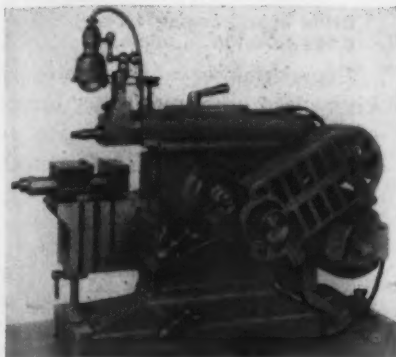
Resume Your Reading on Page 35

NEW

PRODUCTION IDEAS

Continued from Page 38

180 strokes per min. Maximum length of stroke is $7\frac{3}{4}$ in. The table has a $9\frac{1}{2}$ -in. horizontal travel and a $4\frac{1}{4}$ -in. vertical travel. Feed ranges from 0.003 to 0.018 in. The



adjustable tool head is graduated from 0° to 90° for angle work and has a vertical travel of $3\frac{1}{4}$ in. The vise has a maximum opening of $4\frac{1}{4}$ in. *Delta Power Tool Div.*

For more data insert No. 29 on postcard, p. 35.

Die Stand

Provides easy handling of heavy dies for hand finishing operations.

Designed for use with Kellerflex flexible shaft machines the Di-Ro stand of welded construction is 2 ft sq, and 30 in. high. A turn table

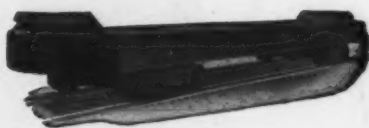


on which the heavy work can be rotated freely is mounted on a heavy duty thrust bearing, and is capable of handling work loads up to 3 tons. A quick-acting clamp

ATLAS

STRIP HANDLING EQUIPMENT

• Strip steel can be handled very economically on rail cars as compared with other means of conveyance. Strip cars can be handled by heavy-duty rubber tired tractors or by locomotives running on the track rails, or they can be self-propelled motor-driven with power supplied by storage battery in the car.

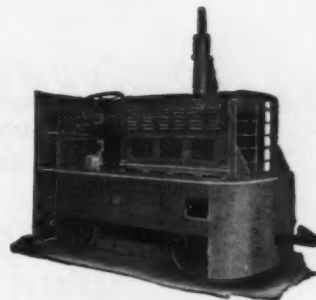


125-Ton DOUBLE TRUCK CAR

for handling steel strip in rolls. This car is hauled by tractor shown below.

SPECIAL HEAVY-DUTY GAS-ELECTRIC TRACTOR

for hauling 125-Ton Strip Handling Cars. Tractors run on rubber tires.



135-Ton FLAT CAR

Powered by storage battery for handling sheet steel.

25-Ton PLATFORM CAR

Powered by storage battery, operates at slow speed and has operator's platform at each end.



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One of five American #3800 Crushers used to process 28,198 tons of metal turnings last year at the Canton, O., plant of the Timken Roller Bearing Company.

TIMKEN gets the most out of scrap

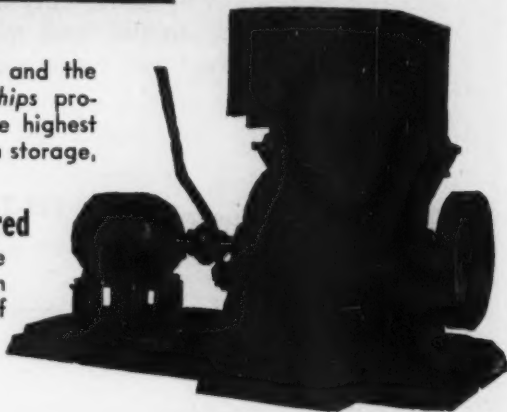
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1. Scrap Value Increased

Scrap prices are climbing — and the more uniform short shovel chips produced by Americans bring the highest scrap prices . . . save money on storage, handling.

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Cutting oil reclamation can be increased to 30-50 gallons/ton when long, curly turnings of steel, alloys, brass, aluminum, etc., are American-reduced and washed.



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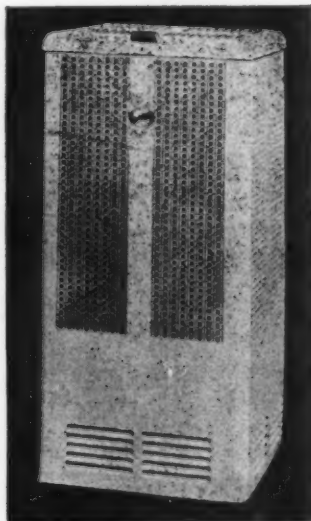
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Hendrick Ornametal is a decorative, lightweight metal grille suitable for a wide variety of applications, such as for stove panels as shown in the illustration.

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"Shur-Site" Treads and
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NEW PRODUCTION IDEAS

Continued

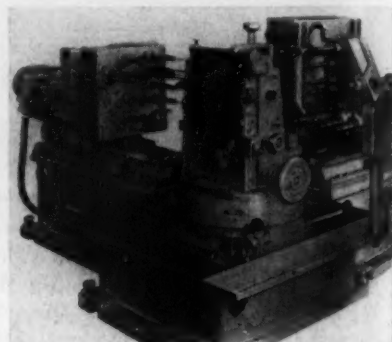
locks the table in any position. A hinged arm, attached to the side of the stand, mounts the Kellerflex allowing it to swing in a 180° arc, giving the operator freedom of movement with the handpiece and keeping the flexible shaft clear of the work. *Pratt & Whitney, Div. Niles-Bement-Pond Co.*

For more data insert No. 30 on postcard, p. 35.

Drilling Machine

Drills holes ranging from
0.098 to 0.199 in. diam.

Completion of a new automatic high-speed sensitive driller capable of drilling 1600 small holes in six faces of 50 plastic cash register



drawers per hr has been announced. The machine is a two-position machine with spindle heads at the right and in the rear. Operations are pushbutton controlled. *National Automatic Tool Co., Inc.*

For more data insert No. 31 on postcard, p. 35.

Utility Mixer

For testing core sand mixtures or
preparing experimental batches.

A new Gordon-Campbell utility mixer is hand operated and has a stainless steel mixing bowl 12 in. diam x 5½ in. high. The complete mixing unit is easily removable from the bowl for cleaning. It is simple in construction and operation, large enough for mixing adequate samples, and mixes thoroughly in a short time. *Claud S. Gordon Co.*

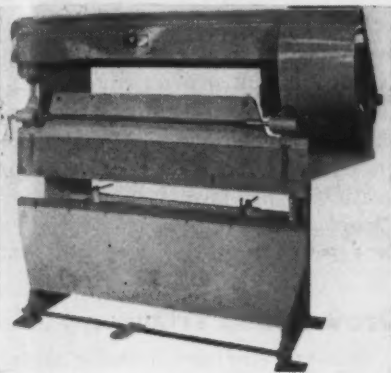
For more data insert No. 32 on postcard, p. 35.

Small Press Brakes

Rugged all-steel welded frames
maintain stability and accuracy.

The Metal Worker line of press brakes for bending, forming, blanking or multiple punching has de-

sign features of big machines. A single plate friction clutch, integral with flywheel, requires no special tools for adjustment; a single plate



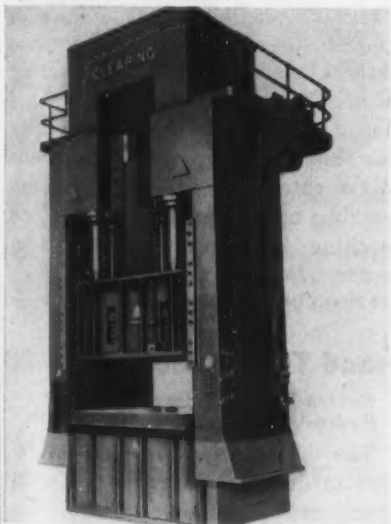
friction brake assures easy and positive engagement; gibbing is positive, with takeup in all directions; ram adjustment equalizes thrust loads through the use of adjustment screws operating with one right hand and one left hand thread; a single through shaft keeps torsional shaft deflection at a minimum. *Airtherm Mfg. Co.*

For more data insert No. 33 on postcard, p. 35.

Hydraulic Presses

With independent hydraulic circuits for blankholder slide and punch slide.

The arrangement of two independent hydraulic circuits, one for the blankholder slide and the other for the punch slide each with its



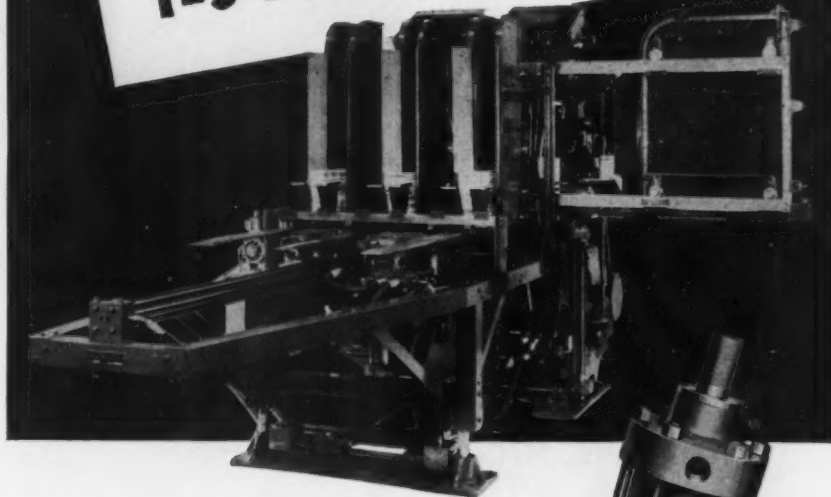
own separate pump, precludes the possibility of losses in blankholder pressure during the punch stroke. Pressure on each corner of the blankholder may be individually adjusted, making the presses suitable for eccentric or irregular draws be-

Job File No. 4617

NAILING MACHINE

feeds wood strips automatically with

T-J AIR CYLINDERS



Here's a typical "push-pull" job performed efficiently by T-J Cylinders!

This special nailing machine—equipped with T-J Air Cylinders—is built by Morgan Machine Co., Inc., Rochester, N.Y., for use by Hotpoint in Chicago. The machine is employed to make up skids for mounting electric ranges for shipment. The three boards as shown in the hoppers on top of the machine feed down one at a time while a cross piece from the hopper extended to the right of the machine is fed in. The long T-J Cylinder projecting out in front of the machine feeds the three boards ahead the proper distance and then stops to have a cross piece nailed to them. It then advances automatically to next position until four cross pieces are nailed to the three lateral strips.

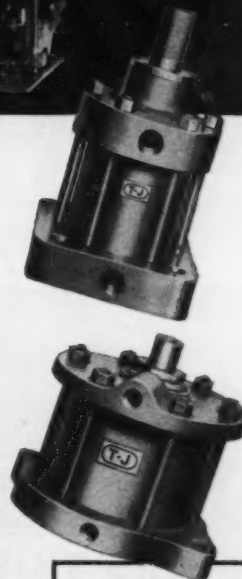
For your tough jobs in power movement—pushing, pulling or lifting—save labor, speed production and cut costs with T-J Air and Hydraulic Cylinders! Many standard sizes and styles... both cushioned and non-cushioned types... 100 lb. or 50,000 lb. Precision built, versatile, long life. Write for additional information. The Tomkins-Johnson Co., Jackson, Mich.

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NEW PRODUCTION IDEAS

Continued

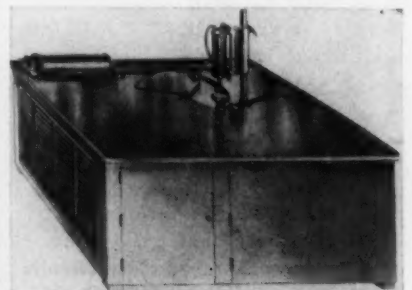
sides the more regular runs. The hydraulic circuits use valves for reversal, insuring quick return and accurate control of pressure. A feature is the provision for slowing the punch slide at the instant the blankholder slide is picked up on the return stroke. Presses are available in any required size. *Clearing Machine Corp.*

For more data insert No. 34 on postcard, p. 35.

Drawn Shell Trimmer

Handles round and irregular shells, up to 12 in. diam, 14 gage thickness.

This new improved Model B drawn shell trimming machine trims shells of practically any



depth. A simple tooling adapter is provided for any size or shape shell, up to 12 in. diam, making it possible to trim round and irregular shells with a minimum 1/16-in. internal radius. Only one external universal trimming cutter is needed for all trimming operations. The work spindle with its variable speed drive can trim shells at the rate of 20 to 500 per hr, depending upon size and shape. The machine is powered by a 3 hp motor. *Dayton Rogers Mfg. Co.*

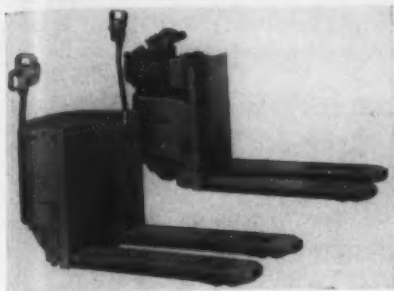
For more data insert No. 35 on postcard, p. 35.

Hand Trucks

Electro-Lift is battery-powered;
Hydro-Lift, gasoline engine driven.

The battery-powered Electro-Lift is driven by a new GE compound motor that develops 1 1/4 hp. A soft, dynamic braking is effective automatically when the operator takes his hand off the control button. The Hydro-Lift with a gasoline engine driving a hydraulic pump and motor is said to have a smoother drive than other types. The same rugged frame is used for

both models. Motor is mounted in the drive wheel. Mechanical self-energizing brakes are actuated by movement of the handle to ex-



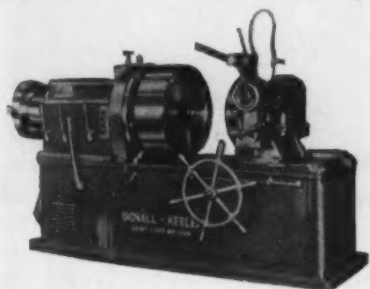
treme position, either up or down. Both models have a short wheel-base for short turning radius and are rated up to 600 lb load capacity. *Clark Equipment Co.*

For more data insert No. 36 on postcard, p. 35.

Pipe Threading Machine

Covers pipe sizes from 1 to 8 in.

The redesigned B&K line of pipe threading machines is modernized in appearance with controls more accessible and machines easier to operate. Features include tapered roller bearings on all shafts and arbors; precision cut gears; automatic lubrication of gears and bearings; electrical re-



versing; power chucking; and rugged carriage positioned by cut-tooth racks. *Bignall & Keeler Div., John Ramming Machine Co.*

For more data insert No. 37 on postcard, p. 35.

Dihedral Coupling

Designed to handle angular and offset misalignment up to 12°.

Misalignment capacity and performance of new couplings are based on a dihedral tooth shape that provides for maximum misalignment with minimum clearance or backlash. Dihedral surfaces of splines provide more tooth contact under operating conditions than with any other shaped tooth, it is stated. Design of the couplings contributes to long life, cool run-

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Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter and Tool Grinders, Hand Feed Surface Grinders, Drill Grinders, Tap Grinders, and Combination Tap and Drill Grinders.



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300 Straight, S. W., Grand Rapids 4, Mich.

October 12, 1950

279

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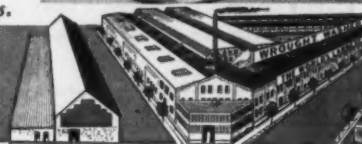
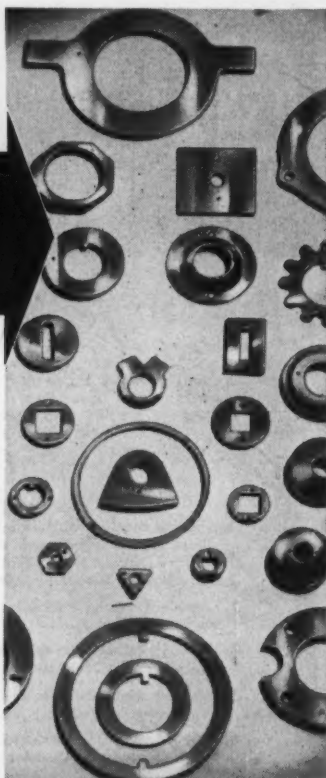
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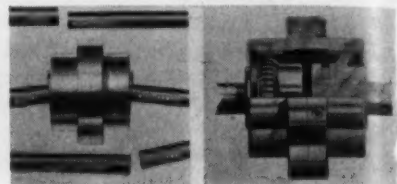
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NEW PRODUCTION IDEAS

Continued

ning and quiet, chatter-free operation. The standard coupling is offered with teeth cut to handle 7°



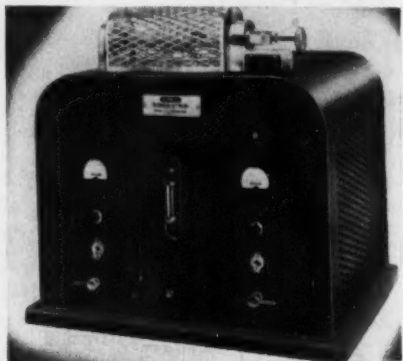
misalignment, and special models are available for handling up to 12°. *Ajax Flexible Coupling Co.*

For more data insert No. 38 on postcard, p. 35.

Carbon Determination

Electronic instrument for rapidly determining carbon by combustion.

The Combustron is a compact, bench-mounted self-contained instrument fully equipped and ready to plug into a power supply of 115



or 230 v, 60 cycle, single phase. It employs induction heating and has features that include instant heating, rapid analysis, visible combustion, and a sturdy Vycor reaction tube. It is available in one or two tube models. *Burrell Corp.*

For more data insert No. 39 on postcard, p. 35.

Hitch Feed

Feeds light gage coiled material; mounts on any press or to die-set.

A new 2½-in. hitch feed handles the lighter gages of stock from 0.003 to 0.050 in. thick. Stock can be fed without buckling. No tools are required to make adjustments for gripping pressure or feed length. Proper gripper plate angle is automatically maintained. *H. E. Dickerman Mfg. Co.*

For more data insert No. 40 on postcard, p. 35.

Resume Your Reading on Page 39

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NATIONAL Triple-Head: 2" LANDIS Double Spindle; No. 8 NATIONAL Double-Head: 1½" LANDMACO Double Gear.

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No. 8 UNITED ENG. CO.; HAYDEN & OSBORN with side shear; No. 28K BLISS knuckle-joint cornering press; 65-ton BLISS trimming inclinable.

SAWS

W-14 AJAX hot saw, 1943; No. 3 NOTCH & MERRYWEATHER cold saw, 1942; GENA cold saw; 18" NEW-TON cold saw.

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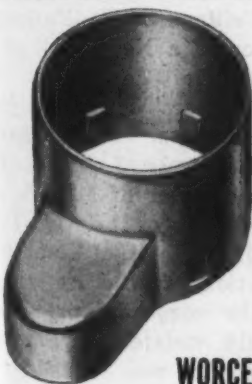
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NEWS OF USED, REBUILT AND SURPLUS MACHINERY

Scarcity Grows—Market reports this week stress the continuing drying up of supply for the used machinery market. Trade sources in Detroit class toolroom equipment, automatics, lathes, shapers and presses as practically unobtainable, if less than 10 years old and in good condition. Pittsburgh reports use somewhat milder language, speaking of late model machine tools as hard to find.

Adding to the scarcity in Detroit is the fact that auction sales have recently fallen off as much as 70 to 80 pct, making it increasingly difficult for dealers to replace the machines they sell.

Expect Defense Orders—A survey of Detroit dealers discloses that even in this city, where most of the defense orders announced so far have been placed, little of the present buying can be accounted for by defense contracts. However, anticipation of defense work is probably the greatest single factor which has led to the critical shortage. Most segments of the industry anticipate a sharp climb in defense work following the November elections.

Prices Spurt Up—With business good in every section of the country, industry has plenty of money with which to bid up prices of the machine tools which are available. Examples from Pittsburgh include a forging machine which jumped in price from \$1100 to \$2750 during the short time it took a dealer to find a buyer for it. Another dealer reported that the price of a machine he was interested in increased from \$17,000 to \$35,000 in a short time.

In many instances these runaway price jumps are believed to be "nuisance" raises, however—made to discourage buyers after the machine's owner has decided he doesn't want to sell it.

Demand Broadens—Used machinery market reports each week

show demand and scarcity spreading to an ever-widening list of types of equipment. Though sheet metal forming and shearing equipment has been in fairly short supply ever since the war, it was not many months ago that used toolroom equipment, automatics, electric motors and other items were a drug on the market.

But this week's reports from such centers as Detroit, Pittsburgh and New York speak of scarcities in all types of machinery. A leading Pittsburgh dealer is running short of totally-enclosed electric motors. A pickup in marine activity has helped move a previously unsalable stock of 115-v dc centrifugal fans for another dealer. Crane and trolley business is picking up everywhere. In a recent sellout of a Midwestern foundry, all seven cranes in the plant went at prices beyond the reach of dealers.

MDNA Directors Meet—The first 1950-51 meeting of the MDNA Board of Directors was held at the Statler Hotel in New York on September 25. A feature of the meeting was President Frank Laurens' report on conditions in Europe and the market for rebuilt, reconditioned and used machine tools there. The directors voted to submit the price control suggestions adopted on August 14 to the NSRB meeting in Toronto.

Price Ceilings OK'd—Following publication of a New York newspaper article describing the MDNA directors' action on price recommendations, a discussion was held between J. M. P. Fox, executive director of MDNA, and a representative of the Anti-Trust division of the Dept. of Commerce. The question of whether promotion of the suggested price ceilings would violate the Sherman Anti-Trust Act was settled satisfactorily—no violation being indicated.